Vols. 1-3 called Hoosier Naturalist
Vol. 4 " The Naturalist (Kansas City
Vol. 5 " Kansas City Scientist No)

Tucker Gift

THE KANSAS CITY

SCIENTIST

ASTRONOMY. GEOLOGY. PHILOSOPHY. MINERALOGY. BOTANY. METEOROLOGY. ARCHÆOLOGY. ZOOLOGY. MECHANICS.

FORMERLY

THE NATURALIST.

CONTENTS.

ACADEMY OF SCIENCE PUB. CO., Publishers.

Room 20 Bayard Building,
KANSAS CITY, MO.

THE KANSAS CITY
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VOL. V. KANSAS CITY, MO., JANUARY, 1891. NO. 1.

FOR THE K. C. SCIENTIST:

NOTES ON THE OWLS OF CHESTER COUNTY, PA.

BY THOMAS H. JACKSON, WEST CHESTER, PA.

In the eastern portion of Pennsylvania, and especially in Chester county, to which most of my observations have been confined, the thickly settled condition of the country and the lack of large bodies of heavy timber make it a rather unpromising field for the study of the Raptores. Coupled with this, a law was in force for some two years in this state allowing a bounty of 50 cents per head for all Hawks and Owls that were brought in, exempting the Sparrow Hawk (360) and Mottled Owl (373), on account of their recognized usefulness as destroyers of mice. As the average farmer's boy could only descriminate between these species after the bird was shot and offered for a bounty, thousands of them were slaughtered, along with their larger relatives, and as a consequence they, as well as the larger species are very scarce. Although the law was repealed at the instance of an earnest effort of a Scientific Society of our town, yet it will be years, perhaps generations, before some of the resident species have regained their former abundance.

In treating of the Strigidæ or Owl family, the list we have to deal with is not a long one but embraces some interesting birds.

The *Barn Owl*.365*,is an erratic resident of eastern Pennsylvania. In this section it is rarely seen, though our local taxidermists have one or two brought in each year and consider them very rare birds. Last season a pair of them were taken in the vicinity of a farm house within a few miles of West Chester at a season of the year that made it probable they were breeding. They have been found nesting in the Tinicum meadows in Delaware county, using hollow trees in the manner of the Mottled Owl, *Megascops asio*. Here the supply of field mice is very abundant, as well as small birds and frogs. There is no authentic record of their eggs having been found in this county.

The *Long-eared Owl*, 366, is a rare resident of this portion of Pennsylvania, although during the cold winters and especially toward the latter end of this season they become very abundant, frequenting the evergreen nurseries near our town in large flocks. They rarely venture out of there hiding places during the day, but at dusk and after

night fall, they scour the adjacent fields and meadows after their favorite food the field mouse, the bones and fur of which, form a large share of the pellets they eject at their roosting places. Only once in an experience of 25 years collecting in this portion of the state, have I found the nest of this species. This was on the 15th of April, 1870. The nest was an old weather-beaten structure formerly occupied by a crow or squirrel. It was situated on a large chestnut tree in a secluded part of the woods. The eggs were much incubated, showing that they were laid not far from the 1st of April. While I was at the nest, the old bird exhibited great distress, fluttering on the ground and trying in a pitiable manner to lead me away. These eggs average in size 1.65 by 1.26. They are glossy white, nearly even ended and somewhat more elongated than the typical owl's egg.

The *Short-eared Owl*, 367, appears abundantly during cold winters in company with the foregoing species, closely associating with them, and they are frequently mistaken for each other by careless observers. The Short-eared Owl is more boreal in its summer home, comparatively few having been known to build within the limits of the United States on the Atlantic coast.

The *Barred Owl*, 368. This bird while a resident of this section, is, at least in this locality, an extremely rare one. Vague rumors of their nest having been found here have come to me but nothing authentic and I have yet to meet with my first specimen.

The *Acadian Owl*, 372, is a scarce winter visitant, one coming occasionally into the hands of our Taxidermists and Collectors. Their diminutive size and retiring habits may make them seem more rare than they really are.

The *Screech Owl*, 373, is by far the commonest of the family. Scarcely an old apple orchard but has its pair that shelter and breed in such favorite locations. They are disposed to court the presence of man and frequently take up their abodes in barns and outbuildings, subsisting on the mice obtainable in such situations. The eggs are deposited here from the first to the 15th of April, a deep cavity on a partly decayed tree being the favorite situation. The curious variation in the coloring of these birds has attracted much attention from Ornithologists and it is not uncommon for members of the same family or brood to show the extremes of coloration from red to gray.

The *Great Horned Owl*, 375, is a constant resident wherever found, though during the past fifteen or twenty years they have become exceedingly scarce. My first set of these eggs was taken on the 22d of February, 1868. The weather was extremely cold and the ground covered deeply with snow. The eggs were perfectly fresh at that time. Since then I have taken some twenty sets of these eggs in this vicinity. With a single exception of three, the complement consisted of two eggs, and the date of finding ranged from February 1st to March 3rd. in all stages of incubution. The nests were all open ones placed in large trees at heights varying from 20 to 90 feet from the ground and in nearly every instance were structures formerly occupied by hawks, crows and squirrels Occasionally I have known of their nesting in hollow trees when suitable opportuneties offered. The eggs were almost invariably of the typical globular shape, yellowish white and considerably granulated.

Snowy Owl, 376. This magnificent bird is known to this portion of the country as a rare winter visitant, coming to us in sparing numbers only during the most severe winters. Its diurnal feeding habit, and conspicuous appearance and a want

of shyness common to many birds, renders it a comparatively easy prey to the hunter and but few that reach here live to return to their Arctic home. A number of years since one of these owls perched upon the gilded ball that surmounts the weather vane on our "Temple of Justice" nearly 100 feet from the ground. It was in broad daylight and naturally arrested the attention of hundreds of people many of whom had never seen such a bird before. The eggs of this bird are similar to those of the Great-horned Owl, though somewhat larger. The texture of the shell is rather firmer and the surface smoother, while in shape they are more elongated. At least such are the characteristics of a set of six in my collection from Sweden It is a rather singular fact, in view of the probable scarcity of food in the far northern regions that these birds should lay such large sets of eggs. Ten or twelve is not an uncommon number and sets containing as few as five or six eggs I have found difficult to obtain.

*Am.. Orn. Union, Nos. have been substituted for the scientific names. [Editor.

Notes By the Way.

To the Kansas City Academy of Science:

I submit a few notes on Colorado. Each visit impresses me more and more. Colorado is the Switzerland of America. But as the geologist is supposed to "run everything into the ground", I must curb my imagination and come down to earth. The eastern two-fifths of the state is a rolling plain, sometimes apparently level, and almost destitute of any vegetation except buffalo grass, which seldom exceeds three inches in height, broom or bitter sage brush, *Yucca mexicana* or "Mexican Soapweed" and an occasional cactus of diminutive size. It is not generally known, but it is nevertheless a fact that there is a ridge or divide that nearly parallels the Rocky mountains and is east of it from 60 to 80 miles. The Arkansas and Platte, as well as the Republican rivers cut through this ridge. It is from 200 to 600 feet higher than the trough or sinus between it and the mountains. For instance, the highest land at Cedar Point--there are no cedars or other trees there—has an elevation of about 5,800 feet, while Denver, 76 miles west—and much nearer the mountains—has an elevation of only 5,170 feet. And again, Pueblo has about the same elevation as Denver, being a little less, but the mesa or table-land that surrounds it has an elevation of about 5,600 feet, while Canon City, nestled at the foot of the mountains, 42 miles further west, has an elevation of only 5,280, one mile. I have never seen eastern Colorado when it was green. In springtime it is yellow, in autumn, chocolate and in winter brown. Most of the western country, where there are no evergreens is much like eastern Colorado in the tints and hues of its landscapes.

From Canon City westward the grade is abrupt. Fremont's Peak, which overlooks the town and is about five miles distant, has an elevation of nearly twice that of the town, or about 10,300 feet. Several peaks in the neighborhood are higher. Westward from Canon City, the railroad enters the canon of the Arkansas river at about one mile and a half from town. About five miles above town, the walls of the canon draw in till they are less than one hundred feet apart. They rise almost vertically 1,200 to 1,500 feet and then slope back abruptly to a height of about 4,000 feet above the railroad track. Around the base of the mountains, about on the dividing line between the coal measures and the Azoic rocks, is a limestone formation which stands or lies with its lines of deposition

running at every angle between a vertical and a horizontal. I have observed this for a distance of 200 miles from Trinidad to the Platte river. At Canon City the convicts in the state penitentiary manufacture a fine lime from it. The "cap rock" of all the coal I have ever observed in Colorado, whether east or west of the mountains, is a soft, yellow, porous sandstone. Around Canon City where this rock is not eroded it is about 250 feet thick. At Trinidad, it is not so well developed, yet it is present. At and around Como in South Park about 100 miles northwest of Canon City, and on the other side of a high range of mountains t e sandstone "cap rock" is from 50 to a 100 feet thick.

The point in the canon, five miles from Canon City, described above, is called the Royal Gorge. For several miles, at least thirty, the Arkansas river passes through a canon with granite, quartzite, syenite or trachite walls rising from 400 to 4,000 feet above the water. The first widening is called Pleasant Valley Park. The walls draw together again and then widen and resolve themselves into mountain slopes where they bound the beautiful North Park, along the east side of which flows the Arkansas river. This park is about fifty miles long and from five to twenty miles wide. At the lower east end lies the beautiful thrifty town of Salida at an elevation of about 7,500 feet. At the upper end of the park at an elevation of about 9,300 feet lies the mining town of Leadville, principally in California Gulch, a tributary of the Arkansas, while a little above the center of the park, and in the only pine grove in it, is the town of Buena Vista at an elevation of 8,000 feet. Inside of fifteen miles from this place are three mountains, Princeton, Harvard, and Yale all of which are higher than Pikes Peak. It is not generally known, but there are more than thirty mountains in Colorado any-one of which is higher than Pikes Peak. Buena Vista is one of the most beautiful little towns I ever saw in my life, but I must not digress.

Near Leadville, I was in sight of the source of the Arkansas river. Here it is a little trout brook. As I looked at its pure water and snowy surroundings, I could not help contrasting the scenery with that at the mouth of the river where I spent six weeks, twenty six years ago, fighting, mostly mosquitoes for my beloved country. I shed more blood on a flotilla near the mouth of the Arkansas river than if I had lost a limb. yet the government has never, never offered me a pension!

From Buena Vista, I took the Gunnison branch of the Denver and South Park Railroad on the evening of the 29th of October and went to the mining camp of St. Elmo. Here I put in four days at attitudes varying from 10.000 to 13,000 feet above sea level. I examined several mining properties here. Had to take bromide of potassium to act as an arterial sedative to prevent hemorrhage of the nose and to quiet my nerves so I could sleep. From here I returned to Kansas City via Denver. From North Park and Buena Vista my route was through the Kenosha Hills and down the Platte canon.

I made some important observations on glacial drift, which I will proceed to give. For several months I have been interested in glacial phenomena in New Mexico. Perhaps it would be more exact to say interested in post glacial drift, for the phenomena are certainly to be attributed to the post glacial. Along the east side of the Rio Grande in New Mexico this drift is abundant. I observed it at a point on the Santa Fe' Railroad about thirty miles south of San Marcial. Immense deposits are to be seen along the western boundary of the desert known as the Journado del Muerto (journey of death). At the time of my,

visit to that region last summer, I reached the conclusion that the immense deposits of breccia to be seen there are the accumulations around an extinct sea, i. e., the gravel that indicated the beach line around such a sea. This breccia is composed of beautiful water-worn gravel of almost every color and a paste or matrix of alkali or alkaline earths and sand. This alkaline matrix in some instances is volcanic lime, and, in others it is potassium salts. Near the old abandoned fort, McRea, there are thousands of acres of this formation that show croppings from twenty to one hundred feet in thickness. The pebbles and gravel in the formation are sometimes common brown or yellow chert, at others, white or clouded quartz, topaz, agate, chalcedony and occasionally an obsidian.

The extinct sea theory did not satisfy my reason, but I mentally accepted it as the best explanation I could give to myself at that time. My last two visits to Colorado have afforded the means of reaching a very different conclusion. All the breccia, gravel, pebbles or pronounced drift that are so abundant in the "parks" or wide valleys, on the mesas, deserts and mountain sides in the Rocky mountain region are undoubtedly of glacial or post glacial origin. The ridge or divide mentioned above, the one in eastern Colorado, is composed largely of drift materials. Here it occasionally takes the form of a breccia, but more often it consists of deposits of sand and gravel thrown losely together. There are three ways in accounting for this ridge.

1. It is a ridge whose bed-rock was too hard to yield to the erosive influences of the ante-glacial waters that poured down the eastern slope of the Rocky mountains and thus remained in the waters as a bar.

2. It is a terminal morraine or a series of terminals.

3. It is a lateral morraine.

If the first proposition is correct, the drift was deposited over the hard rock bar which already marked an elevation on the topography of the plains. These deposits would then only exaggerate the elevation. But I have failed so far to discover any hard bed-rock. On the 9th instant, I noticed where a tributary of the Republican river crosses this ridge that the drift material is exposed to the river's bed. I conclude, therefore, that the first proposition is untenable or from data so hastily gathered is not satisfactorily established.

The second proposition, a series of terminal morraines, seems, likewise unsatisfactory. It is improbable that a number of glaciers would have deposited such masses of material on so nearly the same line. This could not have happened unless the first clause of the first proposition is correct, that an ante-glacial ridge existed at the time of deposition. The facts adduced in discussing the first proposition seem to indicate the contrary.

The third proposition seems tenable. This is strengthened by the government reports which set forth the fact that the glacial drift and the glaciers themselves moved through Colorado in a southeasterly direction along the eastern slopes of the mountains. It is several years since I read these reports, but this is my memory of them. I may be treating a subject that has been exhaustively discussed in some of these same reports, but so long as I am not aware of anything of the kind, I will proceed, not without realizing however that the ignorant frequently venture where the wise would desist. It seems probable to my mind that a large glacier paralleled the eastern base of the mountains. Near Denver it was moving in a southerly direction. This ridge is composed of the materials deposited along its eastern slope. As this glacier moved south, it gradually melted and became reduced in size.

This last assumption accounts for the fact that the sinus or trough is so much narrower between Pueblo and Canon City than it is east of Denver, i. e., further north. At the one place it is seventy-six miles from ridge to trough, at the other the farther south, it is forty-two miles between ridge and trough. Just south of the Arkansas river at Pueblo the mountains swoop around, trend, more in an easterly direction. As this glacier moved south across the river it came in contact with the mountains and was probably about melted and otherwise annihilated by the time it reached Trinidad and the eastern arm of the Ratton mountains. It is possible that the overflow of it passed through Cimarron Pass further to the south-east and found vent on the plains of the Pecos in eastern New Mexico. To sum up then, the drift of Colorado is probable true glacial, while the drift of New Mexico is post glacial, overflow from the glaciers farther north. The drift I observed, the breccia, in New Mexico, including that on the Journado del Muerto (Hoor-nah-do del Moo-ar-to) is overflow that came down the Rio Grande from the west slope of the Sangre de Christo and Ratton mountains. The Journado del Muerto lies between the Rio Grande on the west and the Pecos on the east. It reaches from near San Marcial (Mar-she-el) on the north, to Rincon on the south. It is about ninety by seventy miles in extent. It lies from 5,000 to 6,000 feet above sea level.

About all the drift on the plains, above described in eastern Colorado, lies at about the same level. The highest drift I observed was between Buena Vista and Leadville near the north end of North Park. Here it has an elevation of about 8,500 feet. The drift is very abundant in all of the parks or high valleys of Colorado. It is scarce along the gulches and canons, in fact generally absent. I remarked this in Platte canon. The reason for this is that the gulches and canons afforded such contracted outlets for the waters during the glacial and post glacial epochs, that all drift materials were brought in direct contact with the rushing waters and the currents being so swift they were carried to the plains and mesas below. This fact accounts for the absence of drift materials for so many miles along the upper North and South Platte rivers and its abundance along these streams after they leave the mountains. At no part of their upper course are they above the elevation, at which I observed the drift in North and South Parks and elsewhere in wide valleys. Notwithstanding drift is so abundant in the two parks drained by the Arkansas river, referred to in the first of these notes, there is none along the forty miles of the river where it passes through the Grand Canon. Yet, it is very abundant below the canon, near Canon City, as stated above.

At some future time I hope to call your attention to some of the natural resources of Colorado and New Mexico and possibly of Arizona.

Respectfully and Fraternally Submitted. EDWIN WALTERS.

That cats object to being dosed with medicine is a well known fact. Yet medicine can be administered to the most stubborn cat by mixing it with lard and rubbing the mixture on pussy's sides.

Prof. Holden of the Lick observatory is said to have discovered on the moon parallel walls 200 feet thick on the top, and about 1,200 feet apart.

A local editor was recently shocked on learning that the Lark was not after all the highest flyer. Humboldt's crediting the Condor with soaring 20,000 feet above the level of the sea was news to him.

FOR THE K. C. SCIENTIST:

Owls of Eastern Iowa.

BY GEORGE H. BERRY, CEDAR RAPIDS IOWA.

Perhaps one of the most common of the different species of Owls that occur her. is the Great Horned Owl. There seems to be a remarkable variation in the plumage of this bird. One shot in the spring of '89, is of a dull cinerous brown, the usual white color on the throat being a pale tawny buff. This spring, one shot from the same nest, was a pale gray, resembling the black and white plumage of young Snowy Owls. I have found young of a tawny color, and last spring found a pair almost perfectly white. The eggs are round, of a chalky appearance, and in color, white, of those in my possession, eight in all, six are of a dirty yellowish white, which, on being slightly scraped, reveal a *greenish tinge. The other two are yellowish throughout, as are six eggs in the possession of a friend I used an egg of the White-bellied Swallow for white test, but when compared with those of the Green Heron, they appear pure white. I have now in captivity, two pairs of Great Horned Owls

Pair A, captured in Montana, six years since, age unknown, are light grayish brown. They measure in extent; male 48 inches, female 52½ inches.

Pair B, taken from a nest near Palo, Iowa. three years since, are dark brown with a reddish tinge. They measured in extent; male 39 inches, female 40 inches.

The pair from Montana are the largest of this species I have ever seen in captivity and hunters here-about all agree with me. They are at least the ugliest for I have a couple of bad gashes on my hand received while measuring them.

I would ask the readers of THE SCIENTIST if age governs the color of the plumage of these birds? One afternoon last spring (March 24, '90.) three of us started with guns, climbers, egg boxes, and about sixty feet of rope, to search for owl's nests. About a mile from town we found a large bulky nest in a White Oak. By dint of hard pounding on the tree we finally frightened the mother bird from the nest, when she proved to be a Red-shouldered Hawk. The nest contained three oval, greenish-white eggs, spotted with lavender and pale brown. Nearly a mile from this nest we started a very large, light colored Great Horned Owl, from a nest in a Cotton-wood. It was an old tree, nearly four feet in diameter and fourty feet to the lowest limb. We tried climbing but the bark was to rotten. A friendly Maple offered apparently a safe rout but its topmost branch was still some five feet from the lowest limb of the Cotton-wood. The rope was used here to good advantage when we found the nest contained two young birds of a dirty white color. This ended our day's collecting. The thermometer showing 24° above zero. I may mention that the young birds, being in the nest over an hour from the time the mother bird left and my taking them, were so chilled that they died before we reached home.

Barred Owls reside here but are less frequently seen. They breed almost entirely in hollow trees, the eggs being identical in shape and color with those of the Great Horned Owl, but smaller in size.

Next in frequency is the little Screech Owl. I can give no characteristic description of this species as I have seen them in all the variations from rust-red to slaty-drab. They are rarely seen here from their habit of hiding in hollow trees during the day. One or two nests have been taken near here though I have not seen them. During the early spring an occasional Long-eared Owl is shot.

Snowy Owls are quite common during the winter months, the first one this year

being brought in the third of November. The feathers singly have a brownish tinge, but on the bird are pure white and black. The face, throat, under-wings, legs and toe-coverings are pure white, the remainder of the bird being barred with black. It has short ear tufts which are black with white edges. I received two young birds from my brother in Manitoba, last June. They were nearly grown and brown and white in color. Quoting from this letter: "A pair of Snowy Owls ave bred in nearly the same place ever since I have been here. A pair of young which I sent to Montreal last season were nearly black and white, the brown scarce showing. They breed on an island covered with low bushes and high grass, the nest being built up directly from the ground. There are but two young each time and two broods a year." A Great Gray Owl was shot near here November 28, and a Hawk Owl November 30. Very rarely a Barn Owl is seen, only one being taken this year.

* Our correspondant referring to the eggs of the Great Horned Owl as having a "greenish tinge" we quote from a few of our prominent Orinthologists as follows:

Two or three white, globular eggs.—Davie's *Nests and Eggs of North American Birds*. Rough and of a dirty white color.—Jasper's, *Birds of North America*. Of a white color, with a faint yellowish tint.—Samuel's, *Our Northern and Eastern Birds*. White in color and surface very smooth.—Maynard's, *The Birds of Eastern North America*. White in color.—Stearn's' *New England Bird Life*, edited by Coues. Smooth, and of a dull but clear white.—Langille's, *Our Birds in their Haunts*, White.—Goss', *Birds of Kansas*. While Mr. Jackson in his article, Notes on the Owls of Chester Co., Pa., appearing elsewhere in this issue refers to their eggs as "yellowish white and considerably granulated." We have seen many white sets and not a few with a yellowish tint, but never any having a "greenish tinge." All the sets that have passed through our hands were perfectly smooth with one exception. [Editor.

FOR THE K. C. SCIENTIST:

Glaucionetta.

PROBABLE ADDITION TO THE AVIFAUNA OF KANSAS.

A young male *Glaucionetta* was shot on the Neosho rivr, or near it, December 14, 1890, and was brought to Mr. Pat Floyd, of Burlington, an enthusiastic young taxidermist. The bird was skinned by him, and the skin given to the undersigned, who prepared it after careful examination.

There is no iridescence on the head of this specimen. All white markings save on the belly are much obscured. The beak is faintly marked with red, and the loral patch so illy defined as to make identification by these differentia very doubtful. But a hoary line across the wing and the very clearly defined "frontal and occipital crest" are almost surely diagnostic. A tracing of the head was made on the strength of this probability, and sent with full descriptions, to Dr. Coues, at Washington. With the Dr's usual complaisance, he replied at once, under date of December 23, as follows:

"Dear Sir,—As well as I can judge, from the description and outlines, your identification is correct, and there is no reason why *G. islandica* should not be found in Kansas. Signed, Elliott Coues."

Accordingly, we may safely add Barrow's Golden-eye to the list of Kansas birds, giving due credit to Mr. Floyd, without whose mediation this specimen would never have been preserved.

P. B. PEABODY

What will our American exchanges say to this: "The Loon is indeed a water bird In the northern lakes of England it has been taken forty feet under water on hooks baited for lake trout."

FOR THE K. C. SCIENTIST.

The Movements of Animals.

D. C. JORDAN

The absence of awkardness in the kingdom of birds and animals is more than commonly remarkable. The movements of animals affords an almost infinite range of study in the field of grace.

The common phrase "as clumsy as an Elephant" really and truly has no place in language. There are few animals of any character or size whose total of muscular movements are so considerably perfect and graceful. The idea that all motion is a "falling forward" from the pitch of worlds through space to the infinitely delicate spiral movements of the Bacillus is suggestive of many interesting thoughts.

Ten minutes with a playful kitten will suggest more graceful curves and movements of beauty than could be analyzed in many life-times.

God means to avoid harshness and hardness and rough angularities in all life, from the physical to the spiritual. A drop of water taken from a vase containing cut flowers of a week's standing, showed under a 1-5 objective an army of infusoria, darting about in the ceaseless ministry of their strange life, the endlessly varying lines of movement gone through by these strange creatures impressed me with the absolute absence of gracelessness here. There seemed to be the most perfect adjustment of all motion to every condition of change demanded by the tiny environment of water in which they lived. Some of them coming in contact with particles of organic matter, if after a hesitant judgment the particle bore evidences of nutrition, it was immediately assimilated, if not suited to the fastidious taste of these strange creatures, it was as promptly rejected. Then, too, we all know that no animal, even man, can do two things precisely the same, without remembering just how they were done, the first, second or any number of times before. I have noticed these tiny animals repeat their movements with a peculiar regularity and zest, which suggested the presence of a high and delicately organized memory. It is not directly in keeping with the subject above to speak of the soul-life of these organisms, but so much of psychic beauty and so clear an insight is here to be had into what God thinks and does in the world we do not see with our natural eyes, it is too great a temptation to pass it without a word. It is a polite way of apologizing for God's mysterious ways to call everything outside of the realm of human mind-action, instinct and I am not at all certain that these organisms referred to above are entirely devoid of that subtle law which underlies all thought and all motion in the universe. In their quest for food the prehensile powers of searching to obtain carries with it a priori evidences of a subtle intellection, for the search is prompted by necessity. The power of selection in taking that only which is nutritious, the knowledge of having obtained the elements to supply the first need is the result of a simple apprehension of ideas and there must certainly exist a delicately organized psychic system, so infinitely fine perhaps that even powerful objectives have no resources to reveal. This is suggestive of many long and beautiful thoughts which will help us all into a wider knowledge of the kingdom of God.

Evaporation aggregating a layer fourteen feet in thickness is the amount of water that goes annually from the sea to the clouds. These clouds are then born inland by the wind and the water decends to the earth again in the form of rain, which principally reaches its starting point through the rivers.

FOR THE K. C. SCIENTIST:

Lynched By Sparrows.

One day last spring as I was going down town I saw a flock of about fifty Sparrows on the ground in a vacant lot on the corner of Thirteenth and Central streets. They were making as much fuss and noise as a political ward meeting, where every other man had a candidate for nomination, and all wanted to be heard at the same time. So intently were they engaged that I walked up to within twenty feet of them without their taking the alarm. I found that they had in their midst a full grown young rat who seemed to be completely cowed and paralyzed with fear, and trembling all over. As long as he remained quiet they merely stood around and chattered and shrieked at him, but when he made a move they would pounce down in front of him and drive him back. There was an old wooden side-walk at the time, on Thirteenth street, and it is probable he had a hole under it which he was trying to reach. Having an engagement to meet I was obliged to leave them. In about two hours I came back that way and turned aside to see what had become of the rat. I found the poor fellow lying within a few feet of the side-walk, his head literally torn to pieces; his eyes pecked out and blood and brains oozing from the sockets. He had been lynched in true western style, and his body left as a warning to all depredators. What crime he had committed against this community of sparrows, I could not find out or imagine. I have often seen rats running around in my back yard and sparrows flying about without paying any attention to them, and this individual must have been guilty of some great outrage to bring down such punishment upon him. There is a large colony of these birds living in the tower of the church at Thirteenth and Central, and I have seen unfledged birds lying on the side-walk which had apparently tumbled out of their nests, and perhaps this rat had made a breakfast on one of these unfortunates, which act had aroused the air of a vigilance committee.

It is singular how fast our native birds disappear before these foreign intruders. Ten years ago the trees in our yards were frequented by Mocking birds, Blue birds, Black birds, Cat birds, Robins, and many other species, now it is seldom that one of them are seen. One day last spring a robin lit on the ground in my yard and was immediately surrounded by a lot of these vicious little pests and driven off. The English Sparrow is becoming an unmitigated nuisance in Kansas City and it will not be long until we will have to declare a war of extermination against them, as they are neither useful nor ornamental.

Kansas City, Mo., Dec. 1 1890.

WM. H. R. LYKINS.

Walking-leaf and Walking-stick.

Stanly Wood's *Great Divide* says: "Who ever heard of green leaves falling from a tree, and, after lying on the ground a few minutes, crawl toward the trunk of the tree, ascend it, and resume their former position?" and then proceeds to depict the surprise of some English sailors on an island near Australia when they first discovered the wonderful walking-leaf. There was no occasion to go to Australia to find these insects as they are met with frequently right here in the United States. The walking-stick is another peculiar form of insect life common to America, which received its name from its close resemblance to a twig. Different species of this insect resembling twigs from different kinds of trees.

The Scientist.

FORMERLY THE NATURALIST.

KANSAS CITY, JANUARY, 1891.

R. B. Trouslot, Editor.
Assisted by E. T. Keim, E. Butts, David H. Todd and Sid. J. Hare.

The Academy of Science, Pub. Co.,
Publishers and Proprietors,
Room 20, Bayard Building,
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A 16 page Monthly Journal, devoted to all branches of

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THE space allotted to the Fisheries in the World's Fair will be 125x1,000 feet.

THE Census shows the population of foreign descent in our country to be chiefly the African, Latin and the Teutonic Aryan

EDITORS and Publishers will confer a favor by sending their papers and magazines addressed plainly to: Editor SCIENTIST,
Kansas City, Missouri.

WITH a view to the introduction of the *Cosmopolitan* to the readers of this journal, we offer it to new subscribers in connection with THE SCIENTIST at its regular subscription price. See page 15.

ANY scientific society publishing its proceedings can secure this magazine by exchange, even though their publications be of less value, and we trust the same courtesy will be extended to us by societies having more extensive and valuable publications.

JOHN D. PARKER Chaplain, of Fort Robinson, renews his subscription to THE NATURALIST and also writes a very friendly letter from which we quote.— "Kansas City, the heart of the new west cannot afford to let much smaller cities outstrip her in the onward progress of science. In your marvelous growth the time has fully come for Kansas City to reach out her powerful hand and place her Academy of Science on its feet, for commercial prosperity to be substantial must rest on intellectual and moral foundations."

THE NATURALIST'S change of form and name, will, we trust, be an agreeable surprise to many of our readers. It resulted from a desire to make it more convenient for binding and also at the request of several of our subscribers. We believe the convenience of the new form will more than compensate for the additional expense.

AN Exchange says that the song birds brought from Germany and turned loose in Oregon last year, have prospered and now a large number of insectiverous song birds will be imported. It will not be long before the various publishers of standard Ornithological works will have to issue new editions.

CELLULOSE in wood, (the primitive membrane, free from all deposits of sediment or other matter) is said to be composed of carbon, hydrogen and oxygen, 6 parts of the first to 10 parts of the second and 5 of the third, having the same formula as starch and sugar and can be converted into various edibles both wholesome and savory.

THE statement is made that the seat of the conscience has been located in the veriform appendix or blind intestine and a series of experiments point very closely in that direction. A post-mortem examination on bodies of murderers show the blind sac to be wanting in every case, but a more conclusive fact is given in the case of a practitoner noted for his conscientiousness who submitted to an operation for the removal of the sac; on his recovery he committed a murder.

MR. THOS. A. SHAW, the well known Biblophile of this city, is constantly adding to his stock of rare books and curio. The latest addition, is an unique sailor's dagger with handle and socket made from the tusk of a Walrus, tipped with ebony. On the blade is engraved the figure of a sea monster, on the handle is the figure of a Walrus, also a design intended to convey the idea of a mountain in Japan and leaves of plants and alligators. A very blood curdling looking weapon at short range, in the hands of a piratical Japanese.

SOME time during the seventies, the writer remembers an advertisement in that excellent weekly, *Forest and Stream*, by "Hurst & Sons, 9, 11 and 13 Elm street, Albany, N. Y.," of Photographs, in Stereoscopic slide form, of groups of stuffed birds and animals prepared by Mr. Hurst and on exhibition at the companies free museum at the above numbers. Samples were ordered. On their arrival a more delighted family could not well be imagined. Eventually, as the dollars could be spared, a dozen at a time were ordered, until the series was compleated. For safety and convenience we mounted the slides in an adjustible stereoscope made to order, having a capacity of 400 views. They have proven a source of endless enjoyment and instruction to ourselves and friends ever since.

Some years ago we learned of the sudden death of the sons, who were soon followed by their grief stricken father. This caused the closing and eventual breaking up of the museum. The copy-right of the views was sold to a photographer in New Hampshire, and Mrs. Hurst informed us that the last complete colored set was sold through our efforts, to Prof. Dyche, of the Kansas State University. Our attention was again called to the matter by receiving from Mrs. Hurst of No. 11 Main street, Albany, N. Y., several dozen of these really excellent photographs. The animals are accurately colored as in life, grouped with such surroundings as their instinct, if alive, would select. On the back of each view is printed the class, order, family, genera and species with the common and local name, and a complete description of the subject and its natural history.

Picking up a view at random, from those just received, the first one shows a pair of Mallards, and, quietly resting on the gravelly shore of a small lake. So accurate is the taxidermal work that they don't look like stuffed ducks at all. Their coloring defies criticism and their reflections in the lake which in this instance was living water helps to complete the deception. The second view is of our common Screech Owl, perched on and around an old hollow stump. Both plumages are shown. One specimen is just leaving the down, while another is evidently just alighting on the stump. The one with a mouse in his claws would undoubtedly soon enjoy a good meal, were he only alive. There are five specimens in all shown in this view. The complete set illustrates forty-five species of birds, sixteen species of animals and twelve comic groups of monkeys and other quadrupeds.

Mrs. Hurst has many duplicates of these views, a list of which she will supply on application. We presume they may still be had at 25 cents each, though many of them are really worth more money.

John Critchfied of Graham, Mo., near Maryville, caught an exhausted eagle the other day that measured seven feet four inches from tip to tip. The bird has completely recovered and eats more than a Newfoundland dog.

Minerology.

The Consolidated Iron Works Co. of Kansas City, Kan., has an annual output of 8,000 tons.

A week's output of the mines at Aurora Mo., amounted to $12,560. There was 95 tons of lead, 107½ tons of zinc, and 306 tons of silicate. One mine alone, the Big Bonanza producing 60 tons of zinc in four days.

Pennsylvania's "smoky city" has quite an active rival in Pittsburg, Kansas. Her smelter output for one week being nearly 275 tons and the coal output for the same week was 18,400 tons or 920 cars.–D.H.T.

EXCHANGES.

will be inserted free for actual subscribers.

Copy must be detached from letter and written on one side of paper only; not to exceed five lines, including address, estimating eight words to the line.

A 52-inch Columbia Bicycle for exchange. In good repair, E. T. KEIM, Box 69, Kansas City, Mo.

FINE Kansas City Crinoids to exchange for Crinoids of other locations.
D H. Todd, or Sid J. Hare, K. C. Mo.

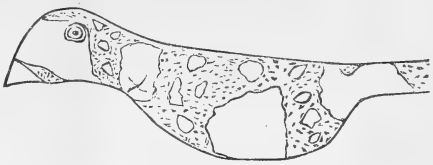
WANTED Indiana and Kentuckey Geol. reports, Will exchange upper coal measure fossils for same.
Sid J. Hare, 2415 East 13th, St. Kansas City, Mo.

THE EDITOR of THE SCIENTIST desires to exchange for Oological specimens not in his collection. Send list and receive his.

A large collection of Lepidopterous Inseets from North and South America, Europe and Asia. Will exchange for species I do not have, or will give Lepidoptera for good fossils. Live pupae and cocoons on hand.
R. R. Rowley, Curryville, Pike Co., Mo.

An exchange says: "Don't be a clam. If you've got to be anything of the kind, be a mud turtle. There you may have some snap to you." If you appreciate a good thing you'll snap at the opportunity and subscribe for THE SCIENTIST.

Archæology.

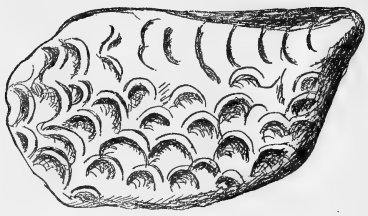


The above cut is figured half the natural size of a surface found near Quincy, Ill., of which Mr. C. A. Thompson writes: "The stone is porphyritic diabase, the large spots are changed feldspar of a cream color; other colors are dark brown and greenish and I think it would puzzle a mineralogist to find a duplicate of the same color in this rare beautiful stone. I think nothing of the kind has ever been heretofore found. I send outlines for remarks". This is a relic of fetichism of one of the American tribes; in the manufacture of these articles the color of the stone and animal represented was selected according to the particular destiny in which the figure was supposed to possess unknown powers. The form is not especially rare. [E. B.

Taxidermists and collectors the world over can rejoice at the prospects of soon obtaining a gun that is light, occupying so little space that it may be carried in the pocket, fired with no more noise than accompanies the discharge of a soda fountain, smokeless, odorless, with no recoil, no heat and so constructed that by turning a screw the bullet may be expelled with any degree of force desired. It is not effected by heat or dampness and the explosive is so cheap that 125 bullets can be fired at a cost of one cent

Drew station on the St. L. K. C. & C. R R. near St. Louis is to have a fish pond stocked with 30,000 fish of different varieties. The enterprise is backed by several St. Louis gentlemen of wealth, piscatorially inclined.

Palæoniology.



The specimen figured above was found in the Upper Coal Measure Rocks near Kansas City, Mo., and is now in my collection. It corresponds very nearly to the description of *Myalina kansasensis* of Schumard, described in the procedings of the St. Louis Academy of Science, Vol. 1, p, 213, (no figure) and may be a fine specimen of the same, the surface markings being well preserved in this specimen. Prof. Shumard says, in his description of *M. kansasensis* "the surface is marked with strong imbricating sub-equadistant concentric lamellae whose free edges are often irregularly crenate. In this specimen, as will be seen by the figure, are decidedly crenate and sub-recurvate thus giving each notch a crescent shape."–S. J. H.

The following M. S. S. have been received: The Study of Ornithology in its Wider Sense Dr. R. W. Schufeldt; Recent Important Discovery of several new species of Fossil Footprints in Jackson Co., Mo., Illus. E. Butts; Duck Movements, Local and Migratory, P. B. Peabody; The Keokuk Limestone and Coal Measures of Pike Co., Mo., Prof. R. R. Rowley; Some Rare Birds of Wayne Co., Michigan, W. C. Brownell M. D.; Amber (Poem by Mrs. E. Nealy), Illus D. H. Todd; Kansas City Trilobites of the Upper Coal Measure. Plate. Sid. J. Hare.

The article on Fossil Footprints recently discovered in this vicinity will be profusely illustrated and will alone be worth a year's subscription.

Reviews and Exchanges.

The January number of the Chautauquan has been received. Mrs. Miller the president of the Bryant Chautauquan Club of Kansas City and wife of Dr Miller, pastor of the Independence Avenue Methodist Church, in speaking of the Chautauquan said: "It is finer than any $4 Magazine published in America to-day," and we voice the same sentiment. The January Volume contains many noteworthy features. Among them may be mentioned the following: The Intellectual Development of the English People, by E. A. Freeman; The English Constitution, by Wordrow Wilson; Religious History of England, by Prof. G. P. Fisher; England after the Norman Conquest, by Sarah Orne Jeweth; Andrew Jackson, by Hon. Theodore Roosevelt, one of the Civil Service Commission. This able writer has promised an article for this volume on the present condition of the Civil Service of the United States; The Mixed Population of Chicago, by J. C. Ridpath. Ridpath as a historian is so well known that further comment is hardly necessary. The statistics gathered by him as related in this article are startling. The theme is full of suggestion and thought and is timely.

The subject of various nationalities of the the United States will be continued throughout the volume. The French in the United States will be described by one who knows all about them. Mr. P. F. De Gournay. The Bohemians are in the hands of Mr. Theodore Capek of Omaha who knows his subject well. Prof. Calvirs Thomas of Michigan University will show what the Hollanders have done and are doing in our midst. Others are to be announced. Among the many interesting articles in Womans' Council Table, may be mentioned, Color in Housekeeping, Winter Furnishing, Housekeeping for Two and One Truth in Life, are particularly suggestive. The Editorial department is ably managed. Koch's Consumption Cure; Crivice and the Public; City Immigrant Population, all showing the writer to be a man abrest of the times in which he lives. This magazine, to say nothing of the work it so systematically lays out for various circles, is a great educator. In the present volume the article upon the use of "shall" and "will" shows the old familiar truth in so strong a light that the reader, if he has become sluggish in the use of good English, is reminded of it in a very forcible manner. The news items in the summary are briet and well selected. This magazine is edited by Dr. T. L. Flood, Meadville, Pa,, and published at $2.00 per year.

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*The Cosmopolitan is really a $4.00 magazine.

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EDITOR KANSAS CITY SCIENTIST.
KANSAS CITY, MO.

To Oologists.

I have a few choice sets of each of the following species to dispose of. They are mostly from Tamaulipas, Mexico, collected during the season of 1890. They are carefully prepared and have full data. Will deliver free to any portion of United States or Canada on receipt of price which is per egg.

THOMAS H. JACKSON, West Chester, Pa.

203 Chestnut Bellied Scaled Partridge, sets of 12,15 and 16, 40c; 310 Mexican Turkey, sets of 12 and 14,75c; 311 Chachalaca, set of 3 and 4,50c; 313 Red-billed Pigeon, sets of 1 and 2, 1.00; 318 White-fronted Dove, sets of 2, 25c; 319 White-winged Dove, sets of 2, 25c; 320 Mex. Ground Dove, sets of 2, 6 c; 335 Harris's Hawk, sets of 2 and 3, 50c; 362 Audubon's Caracara, sets of 2 and 3, 1.00; 373 Texan Screech Owl, sets of 3 and 4, 30c; 375 Western Horned Owl, sets of 2 and 3, 1,00; 387 Yellow-billed Cuckoo, sets of 4, 5c; 410 Golden-fronted Woodpecker, sets of 4 and 5, 40c; 419 Merrill's Parauque, sets of 2, 3.00; 421 Texan Nighthawk, sets of 2, 30c; 487 White-necked Raven, set of 6. 75c; 493 Red-winged Blackbird, sets of 4 and 5, 3c; 505 Hooded Oriole, sets of 4 and 5, 50c; 508 Bullocks Oriole, sets of 4 and 5, 10c; 508 Bullocks Oriole, nest, 20c; 512 Great-tailed Grackle, sets of 4 and 5, 10c; 554 White-crowned Sparrow, sets of 3 and 4, 25c; 586 Texas Sparrow, sets of 4, 5 c; 593 Texan Cardinals, sets of 3 and 4, 30c; 706 Sennetts Thrasher, sets of 4 and 5, 10c; 707 Curve-billed Thrasher, set of 4 and 5, 10.

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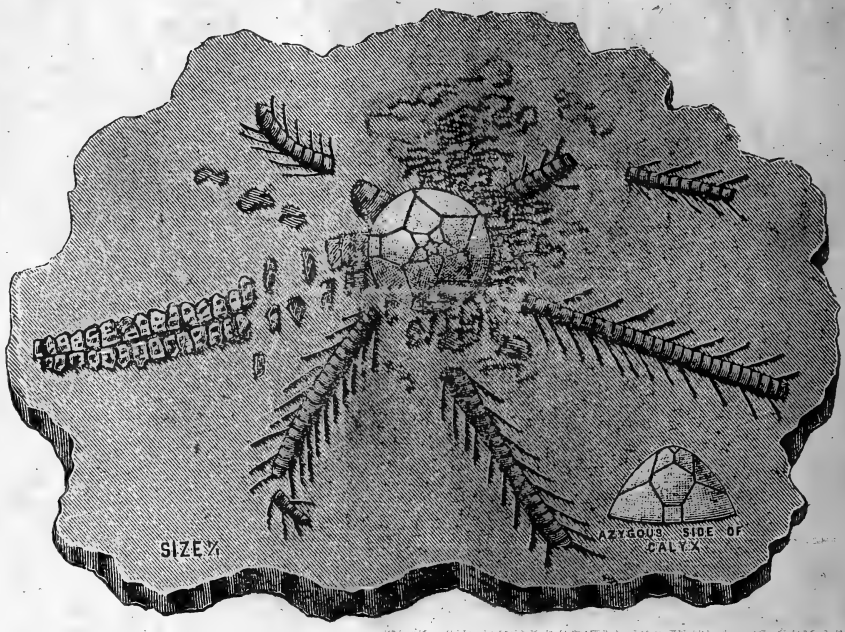

AZYGOUS SIDE OF CALYX
SIZE ½

THE KANSAS CITY

SCIENTIST

ASTRONOMY. GEOLOGY. PHILOSOPHY. MINEROLOGY. BOTANY. METEOROLOGY. ARCHÆOLOGY. ZOOLOGY. MECHANICS.

VOL. V. KANSAS CITY, MO., FEBRUARY, 1891 NO. 2

Official Organ of the Kansas City, Academy of Science.

FORMERLY

THE NATURALISTS.

CONTENTS.

THE KANSAS CITY
SCIENTIST
ASTRONOMY. GEOLOGY. PHILOSOPHY. MINERALOGY. BOTANY. METEOROLOGY. ARCHÆOLOGY. ZOOLOGY. MECHANICS.

VOL. V. KANSAS CITY, MO., FEBRUARY, 1891. NO. 2

FOR THE K. C. SCIENTIST.

Recently Discovered Foot-Prints of the Amphibian Age, in the Upper Coal Measure Group of Kansas City, Missouri.

BY EDWARD BUTTS.

In grading one of the Jackson County roads recently, through the bluff immediately south of Brush Creek on a southern prolongation of the line of Main Street, in Kansas City, Missourri, a vertical cut was made about thirty feet in depth. Most of this excavation was in blue shale which ordinarily disintegrates unstratified. On account of a large percentage of sand in this locality, a portion of the shale after exposure splits in layers in many cases not to exceed one thirty-second part of an inch in thickness.

This sand-mingled strata, marks the line of an ancient sea coast and is most abundant elevated ten feet below the top of layer number ninety-one of Mr. Broadhead's geological survey of the state, which layer here has a total thickness of twenty-five feet and dips to the northwest about one half of one percent.

Upon this coast line, there still remain imprinted on the rock, animal traces of such as inhabited the earth near the closing epoch of the carboniferous age.

With these prints are associated *Orthoceras cribrosum*, *Nuculana bellistriata*, *Pleurotomaria inornata*, *Myalina swallovi* and other shells characteristic of the Upper Coal Measure group, also fucoids, lignite, suncracks, ripple marks and hail prints.*

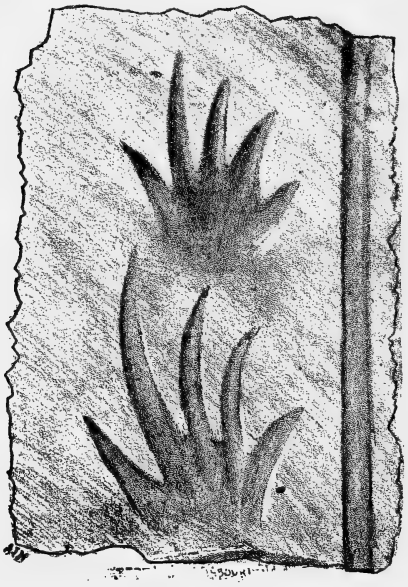
It appears that we have before us an engraved chapter of the preadamite world which is much easier to translate than many of the inventions of human intelligence that have been made to perpetuate existence historically.

Here, elevated one hundred and fifty-four feet above the mean water of the Missouri River, there existed a sea. Its shores stretched with a long gradual rise to the southeast. As the moon passed above, the tide came in, bringing shells and sediment which formed, one by one, the thin layers upon the marshy beach. The recession of the tide left on the shore the ripple marks whose depth and distance are in proportion to the velocity of the wind which formed them. Then the reptiles came running too and fro along the shore, feasting upon the shell-

* These prints are generally called rain prints, but it is not believed that the force of a falling rain drop would be sufficient to impress several layers of the shale, as is the case here.

fish left by the waves. This is repeated for a considerable time, as shown by the number of deposits. A drought then occurs during which the sun's hot rays parch and crack the surface. This is followed by a great storm which comes from the southeast; hail-stones descend and the lightning fires the neighboring forest. A high wind scatters the fragments of charred wood over the beach, the accompanying flood deposits a vast amount of alluvial sediment and finally subsides, thus rock number ninety-one became a part of geological history.

As quite a variety of the foot-prints have been found which will, from time to time, be figured, it is considered advisable to present the following names and descriptions.



Genus—*Notalacerta.*

(Ety. *Nota*, mark; *lacerta*. lizard.)

Feet four, toes four or five expanding outward; tail dragging; steps separated.

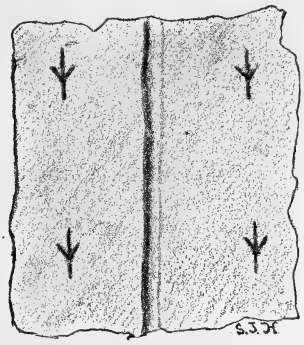
Species—*Notalacerta missouriensis.*

Each foot has five toes and each toe tapers from the base to the extremity. The three middle toes curve inward; toes long, compared to size of foot. Length of front foot, one and one-eighth inches; length of hind foot, one and one-half inches; the spaces between the prints alternate one and one-half inches and three inches; these spaces also alternate with the opposite side; lateral width from center to center of print, two and one-eighth inches; tail one-eighth of an inch in width and continuously dragging.

Locality—Upper coal measures of Kansas City, Missouri.

Species—*Notalacerta jacksonensis.* There are four toes on the front foot and five toes on the hind foot; all the toes are short and nearly the same width throughout. The front foot is six-eighths of an inch long and the hind foot is one and one-eighth inches long. The spaces between the prints alternate one and one-quarter inches and two and seven-eighths inches; these spaces also alternate with the opposite side; lateral width from center to center of print, two and seven-eighths inches; tail three-thirty-seconds of an inch in width and continuously dragging.

Locality—Upper Coal Measures of Kansas City, Missouri.



Genus—*Crucipes*.

(Ety. *Cruci*, cross; *pes*, foot.)

Foot prints equidistant. Toes three; heel projecting back; tail dragging.

Species—*Crucipes parva*. (*parva*, little.)

The lateral toes project forward and are located about midway in the print; length one-quarter of an inch; stride seven-eighths of an inch; width seven-eighths of an inch; tail three-thirty-seconds of an inch in width and continuously dragging.

Locality—Upper Coal Measures of Kansas City, Missouri.

Genus—*Duovestigia*.

(Ety. *Duo*, two; *vestigia*, trails.)

A continuous trail of two parallel sets of markings.

Species—*Duovestigia scala*.

(*scala*, ladder.)

Two parallel sets of markings resembling very much an impression of a braid. Width of each, one-quarter of an inch; width between centre of each, six-eighths of an inch; the outside markings are nearly twice the length of the inside markings and all are directed to the rear.

The Study of Ornithology, in its Wider Sense.

By R. W. Shufeldt.

There are a great many ways in which the science of ornithology may be studied, and these represent, as it were, so many planes from which the various classes of students regard the subject.

In his way, and in a certain sense, the humblest taxidermist may be considered as belonging within the pale of ornithology, but the variety that I have in mind probably represent the class that possess the least knowledge of the great breadth of the field when considered in its entirety. They occupy the lowest plane. They eke out an existence in "stuffing" and "setting up" birds for boys, for sportsmen, and for casual buyers. Such people sometimes are found occupying the rear nook in a gun store, or perhaps some lowly shop of his own. Often they are entirely ignorant of the scientific names of birds, and only familiar with the common local names of the species of the region where they reside. In the majority of instances their taxidermy is execrable. Such persons, however, are often useful, and there are cases innumerable where they have been the means of saving the skin of some very desirable specimen, which would otherwise have been destroyed, and thus never have come into the hands of science.

Viewed along this line, such individuals by no means limit what may be done in and for ornithology through such chan-

nels. All manners and kinds of taxidermists exist, and they may in special cases come to have a very high appreciation of scientific ornithology. Occasionally they labor in large and handsome establishments of their own, and through careful study, come to master scientific ornithological nomenclature ; much of topographical avian morphology; postures and habits of birds; acquire artistic tastes, and master the truly scientific preservation of birds. When thus skilled and fully so, a taxidermist of this order becomes an acquisition of the highest value in some large general museum; and when there found, with every facility given his art, ornithology can be pushed no further in that direction.

Passing to another class we find its lowest plane occupied by individuals the world over, who simply collect bird-skins for the sake of collecting them to look at, and, in a way, admire. People of this character may often be found who are also grossly ignorant of even the common names of many of the specimens belonging to their collection, and could not give the scientific one correctly for any bird in their possession. Starting then, from such a point, and ascending a grade this line when pursued to its culmination is found to be occupied by ornithologists of a very high degree of excellence. They may be the owners of very large and complete collections of bird-skins of their own, or they may be the curators of such collections in the various museums. Ornithologists of this order have a wide knowledge generally of the literature of ornithology, are enabled to scientifically name many hundreds of birds of the world's avifauna; are largely informed in all the habits and identification of the class; possess considerable information upon the geographical distribution of birds, and the relation of these vertebrates to the other existing classes, and finally, may have a moderate degree of knowledge of bird structure and some few other kindred branches. Beyond this point, however, they do not ascend.

Very different is another class, and these may be designated as the *ornithological book-worms*; and among them may also be found students of every degree of proficiency, as they are passed in review along the line that terminates in the most learned type of the order. Selecting an example of the latter, we find a person who may never have skinned a bird in his life; never have personally collected or dissected one; who rarely has observed them in their native haunts; — and yet, such a one may possess a most profound and far-reaching knowledge of scientific ornithology in a great many of its branches. We do not consider, however, ornithologists of this group to be the most finished ones to which the science can lay claim.

Lastly, we come to define these, and what may be considered the finished, scientific ornithologist, and the lines along which his studies lie, that lead up to the position he should eventually hold. He has passed through the classical collegiate education; he has mastered the art of taxidermy, practically, in all of its higher fields; he has had a wide experience in collecting birds over very varied and different geographical areas ; he has formed at least one scientific study— collection of bird skins, scientifically labeled; he possesses a comprehensive knowledge of the past and present literature of ornithology in its widest range; he is thoroughly informed upon the scientific names of many hundreds of birds and can so designate the specimens on sight, as well as have a clear understanding of the geographical distribution of the class, a knowledge of avian habits, nidification and allied subjects. Moreover he is an artist, especially in water colors and has likewise mastered the

various modern modes of representing objects, including in this line the use of the camera, the various "processes" for reproducing figures and much more that relates thereto. He has a knowledge of music, and so enabled to appreciate, scientifically, the subject of the various songs and notes of birds. He is a keen observer of all matters, a constant reader and an accurate describer (either verbally so or in writing) of what he sees. Further he possesses a good knowledge of natural science in general in its most far-reaching sense and in particular a clear comprehension of the history of extinct forms of birds and their reptilian allies, of their relations to existing types and be well read in the literature of such subjects. To this we must add a long and practical training and a final conception of such subjects as the physiology and psychology of bird life; the morphology of birds in its many details; the evolution and distribution of the class ; ornithological taxonomy and affinities and the position of this group of vertebrates in the system. Physics, chemistry and mathematics will have been dealt with in his collegiate education and these will not infrequently come into use in the labors of the scientific ornithologist. Such an education becomes still more highly finished when the student has received a long practical training in the use of the microscope in all its branches, including researches in embryology and the histology of animal tissues and these latter applied especially to birds. Combine such a knowledge and the person who most nearly masters it, approaching the goal it represents, is in our estimation the type of the philosophical ornithologist. He becomes great when he gives to the world the results of his labors, and to attain to such usefulness is by no means in these days impossible.

Notes By the Way.

The attention of the Academy is called to a few additional observations on Colorado and New Mexico. My work has taken me over much of these countries, but time—the great desideration with the observer of nature—was frequently lacking to reach correct conclusions.

The distribution of timber in these countries is somewhat peculiar. None is found in the foot hills of any consequence except an occasional grove along some stream. These groves consist mainly of cottonwood, box-elder and white elm. The cottonwoods are usually the narrow-leaved variety. But to the peculiarity. The mountains have no timber above 11,000 to 11,500 feet above sea level and they are almost equally destitute of timber below to 6,000 to 6,500 feet of elevation. The timber zone is, then, about 5,000 feet in range of altitude. To fix in the mind the distribution of timber in the mountains of Colorado and New Mexico, take a dozen or a score of over-cup or burr oak acorns and set them in an irregular row to represent a chain of mountains. Place the stem ends down and the cone ends up. The rough over-cups will represent the scrubby timber, cactus and sage brush of the foot hills. In imagination, exaggerate the fringe at the top of the cups. This belt will represent the zone of good timber—pine, spruce, etc.—while the smooth shuck—pericarp—as it extends above the fringe line—will represent the bald mountain tops that extend above timber line. The timber gives out, as one ascends the mountain slopes, almost as abruptly as does the fringe on the acorn cup. This description may not be couched in the most scientific language, but the comparison will help to an understanding of the timber distribution of the west.

In Colorado, the first growth above the cactus—tree cactus, I mean—sage brush, etc., is usually pinion—pro. pinyon—and scrubby deciduous trees, while in New Mexico, this foothill zone usually produces scrubby live oak and pinions which are followed, as one ascends, by pines, cedars and junipers. I have never observed spruce in New Mexico, but in Colorado it grows abundantly up to timber line. On Chrysolite Mountain—about 60 miles southeast of Leadville—I observed a dense growth of white and red spruce up to an elevation of 11,500 feet above sea level.

The summer snow line is usually, on the north sides of the mountain slopes, about from 12,500 to 12,750 feet above sea level, while on the south and southwestern slopes, the snow line—during July and August—is from 1,000 to 1,500 feet higher. In the extreme southern part of New Mexico, there is no snow and, consequently, but little timber at any elevation.

Fortunately for these countries, the timber is most abundant where there are minerals and other resources that attract population. But the timber lands of the Rocky Mountains are being rapidly denuded. As one passes up or down the narrow valleys or canons of this region, he will frequently see what appears, in the distance, to be white, conical-shaped, bee hives. A closer view reveals the fact that they are charcoal kilns. Hundreds, possibly thousands, of these kilns are gradually, but surely, consuming the timber from off the mountain sides and converting it into charcoal for the smelters at Leadville, Denver, Pueblo and other points. But the coals of these countries are being developed and already form an important item of resource. The eastern coal belt of Colorado commenced in the southeastern part of the state near Cimmarron pass and extends in a westerly direction to Trinidad. From here it deflects to the northwest and extends along the base of the mountains almost to Colorado Springs—about 150 miles. As one goes up at the rate of 216 feet to the mile from Trinidad to the top of the divide—at Ratton Pass—he can not fail to observe that the coal measures nearly parallel the grade of the railroad all the way to the top. No granite or other azoic rocks appear. The tunnel at the pass seems to have penetrated carboniferous rocks only—the cap rock being a thick sandstone and, if I am not mistaken, about on the same geological horizon as the Warrensburg, Mo., sandstone.

The above grade does not average 216 feet to the mile, but the track rises about 2120 feet in sixteen miles with several miles at a grade of 216 feet. It will be seen from these figures that the average dip of the coal or carboniferous rocks is not less than 125 feet to the mile for from fifteen or twenty miles, as the dip extends east of Trinidad.

I have seen no official figures on this coal field, but think it fair to estimate it at about 1500 square miles. The vein now mostly worked is from four to seven feet thick. The members of the Academy are well acquainted with the Canon City coal. That at the south end of the field is not so nearly an anthracite, but is better adapted to the making of coke. Perhaps none of the coals of Colorado are equal to those of Pennsylvania for coking purposes with the single exception of the Gunnison coal. I do not know the size of the Gunnison field, but it is undoubtedly a very important one. I tried to go over to inspect it last month, but the tunnel across the continental divide at the head of Chalk Gulch was not considered safe, so I postponed the proposed survey till a more convenient season.

The coal field around Como, Colorado.

in South Park, is quite extensive and the coal seems to be about as good as that at Trinidad, but not so good as at Canon City.

Speaking of the coal at Canon City calls to mind an unusual geological phenomenon. It is possible to stand on the cap rock sandstone above the coal—possibly 80 to 125 feet—and shoot a rifle ball against the granite wall of a mountain that rises 4,000 feet above you. Such a phenomenon I observed about two miles southeast of Canon City. Now, this coal belongs geologically about 2200 feet above the granite, hence, here is a geological fault of 6,200 feet in extent! Nature has dealt with Colorado on a grand scale.

While at Canon City, let us look a little farther at the natural resources. At Florence, ten miles east, and extending for miles, is the great oil field from which much of Kansas City's supply is obtained. Here are about 230 oil wells. Tanks and derricks are to be seen on every side. Some of the best wells yield from 200 to 300 barrels daily. Much oil is used for fuel, yet the shipments of refined oils amount to from 1,500 to 3,000 barrels per day.

Within a radius of five miles are at least 2,000 coal miners at work in the mines of Oak Creek, Coal Creek, Williamsburg, Brookside and other small places. In this neighborhood are several deposits of the finest gypsum and, at least one, of marble—very much like Cararra. I have secured a sample from my brother for the Academy. This marble crops within a few hundred feet of the railroad. The finest limestones are abundant here. The convicts in the penitentiary at Canon City are principally employed in the manufacture of lime. Much lime is made at a place about six miles southeast of Buena Vista—on the east side of the Arkansas river. At this latter place, there are large deposits of pure white calcite much used for making lime and also largely shipped to smelters to be used as a flux in the treatment of ores.

About ten miles from Leadville and extending for miles is a field that yields fine iron ores. Some of the iron plants at Pueblo and Denver use these ores, so I am informed. Much of this ore is used for fluxing certain ores.

The finest granite abounds in many different parts of Colorado.

The most beautiful I saw was in Platte canon about fifty miles west of Denver. Some of this is a beautiful flesh color. I would want no finer monument over my grave than a block of this granite.

There is much water power—little of which is utilized—in various parts of Colorado. On the upper Arkansas river alone there might be developed, in seventy-five miles, several thousand horse power.

I can not stop to speak of the agricultural resources and scores of other items, of lesser importance, among which are fine clays, mineral paints, sand, gravel, artesian water, hot springs, mineral waters, etc., etc.

Now, a few words on New Mexico, the sunny "American Italy." For an all-the-year-round climate, New Mexico certainly easily leads any other American country. I have no interests nor friends in the territory and hope I speak without prejudice or partiality.

The mineral resources of New Mexico are certainly as great as that of any other country, but they are, with the exception of a few localities, undeveloped. Timber is not so abundant in New Mexico as it is in Colorado, but many forests abound, and wood for fuel and mining purposes is usually plentiful.

There is an undetermined coal field in the Ratton Mountains in the northern part of the territory that is a continuation of the Eastern Colorado field. I say un-

determined because it is undetermined as to extent. The quality of the coal is much like that of Trinidad.

The strangest geological phenomenon I ever heard of, or saw, is presented in connection with the coal formations of New Mexico—most notably near Cerillos (pro. Se-re-os) about, say, fifty miles north of Albuquerque. Here are twenty-two veins of coal! They vary from one to seven feet in thickness. The united thicknesses of the workable veins is probably forty or fifty feet! But this is not the phenomenon! The upper four veins anthracite! Who ever saw anthracite above bituminous coal and in close proximity to it? Has several thousand acres been upset? If I live long enough I mean to know more of this strange formation.

East of the Pecos (Pa-cus) is said to be an extensive coal field, but I have never traveled that way.

Before leaving Cerillos, let me say that in addition to extensive mines of gold, silver and copper, it has fine iron ores, limestones for flux, the beautiful Rocky Mountain red sandstone, so highly prized for many structural purposes, white fire clay, etc., etc.

Eugene H. Cowles, the inventor of the Cowles method of manufacturing aluminum, he who was shot a few months ago in Montreal, Canada, told me in January, 1889, that the coke and iron ores of Cerillos are as fine as the world affords. As he is a thorough metallurgist, I think his statements are reliable.

About sixty miles south of Socorro, no; Magdelena, is some very fine marble of two or three colors. I am informed that there is an abundance of marble in several different localities in the territory. I have observed granite suitable for building purposes in many places. In Chloride Gulch, in Sierra County, I saw some fine gray granite.

The hot springs and mineral waters of New Mexico have been famed for more than a century.

The most noted are Las Vegas, Hot Springs and the Ojo Calientes—pro. O-ho Hai-en-tis—this last is Aztec for hot water.

Wherever water can be had for irrigation, the soil is wonderfully fertile. Alfalfa yields from three to four crops annually, and from two to three tons per acre for eachcrop. The grapes of New Mexico are the finest in flavor I ever tasted. The center of the grape industry is around Las Cruces in the famous Mesilla—pro. Mes-se-yah—valley which was obtained, as you know, by the Godsden purchase of 1853. Figs and olives flo irish in the same valley. This valley is simply an enlargement—or eastern extension—of the Rio Grande valley near Las Cruces.

I must close this rambling letter. Hoping to be with you personally at the next meeting of the Academy, I am

Yours truly,
EDWIN WALTERS.

Little Rock, Ark., Dec. 12, 1890.

FOR THE SCIENTIST;

In the Nature of Things.

BY D. C. JORDAN.

That phrase "In the nature of things," is suggestive of many peculiarly interesting thoughts when we come perfectly to realize that in the nature of things lies all the secret of life, growth, and the undetermined experiences of death. It is because we do not perceive the law, and understand the simple varieties of nature that we are mostly mystical and obscure in our modern philosophy. "It was a long time before mathematics had logarithms or algebra," we all creep before we walk. I once had the opportunity to examine a patch of sputa ejected by a consumptive in an advanced stage of that disease. The sputa was placed

under a 1-12th inch oil immersion lens of enormous aperture. It had a working possibility of 15,000 diameters, or as we might say in a larger fashion, magnified an object 125,000,000 times its natural size. I could see nothing but an illuminated white field with not the suggestion of a living object upon it; and not until instructed what to took for did I see the tiny bacilli at work upon the fragments of lung tissue they had succeeded in tearing off. My eyes had to be opened before I could look into this kingdom.

The great Philosopher has said, "The kingdom of God is not far from any one of you." There is a larger sense in which we must know life, than merely by the strangely impressive elements which affect us from without. Whatever interpretation we put upon nature it is not the right one unless it arises from a knowledge of her law. The point where the human being became more psychical than physical is hardly determinable for the still lapse of ages furnishes no data. But we are mostly soul now, and the pathless wilderness of the world that stretched out so infinitely mysterious before our forefathers seems now to show some clearer light, flashed from the morning of the eternal day. We are on the eve of a new philosophy. It is but a short cut into the kingdom, and the highest and loftiest concept of the eternal lies in that simplest manifestation of Himself "In the nature of things."

Last summer I captured a large moth miller, such as sap the sweets from the moon-flower and trumpet-creeper. I was interested in the structure of his eye; I found it to be a compound eye, the cornea delicately perforated with hundreds of tiny holes into which seemed to be inserted a series of prismatic lenses, beautifully arranged so that each aperture was supplied with a perfectly formed lens. Those of you who are more familiar with entomology have doubtless observed more carefully, and readily understand what I describe; but what most interested me, and what I had never before known, was the fact that this little creature was unlike us in that it could see in all directions at once, i. e., all directions bounded by his sight-area; that in direct vision was a thing unknown to him; that he saw his world all at once, which was changed and widened to him only as he darted from one point to another. We do not see half our world; in fact the scientifically possible point of our direct vision is an almost imperceptible spot, everything else seen beyond its limitations comes of indirect vision. There is a lesson here for us which drops into the kingdom of moral and mental truth. we must see more of the world about us.

We must see it with less guessing and indirect vision; the certain perception of knowledge and the larger view from the field of the soul will only let us in through the wide gates of nature into the kingdom of the Eternal.

It is so much easier to be inspired by enthusiasm than to search out the truth. The elements of knowledge are imperishable they are hard to get; it requires work, but not ill-guided labor. It requires the deep and ceaseless operation of the soul-functions, but they must be in the right direction. It is not uncertain but that in the nature of things lies the clearest exposition of all mystery in the mental and material world. Why should we be afraid of nature or her revelations? She is our handiest interpreter, she will make it plain. A very eminent surgeon now living, says, "the time is not distant when diseases will be treated more generally by mechanical means than by drugs."

Shall Aesculapus forever be our criterion? Shall we have Dana or Copernicus? Andrews or Galileo? Demosthenes or Gladstone?

A slope of rocky hill-side in western Connecticut contains a wonderfully curious and interesting deposit of minerals. Some

of these minerals have undergone very singular transformation, some are in a state of decomposition, and others, which have made the mysterious transit from what they were originally to a new, and distinct physical and chemical composition; the atmospheric, chemical and other agencies, acting upon and through the mineral, has made a complete and absolute transformation.

One mineral in particular, (Spodumene) has suffered a radical change in every repect (excepting the form of its crystalization), possessing an entirely different form chemically and physically, so that its original identity is entirely destroyed. What was originally called Spodumene must now be termed Cymatolite, or what is called in mineralogical terms a Pseudomorph, after Spodumene. But in the transition the slements so mysteriously wrought upon have been changed into an immaculately white, pure mineral, so delicate, and silky and white as to suggest nothing but purity. If nature shall work so silently and beautifully within the secret recesses of her labaratory shall we be fearful to let her enter the holiest and sweetest of our thoughts, with the clear white light of her truth, and the lovely power of her strong and beautiful spirit?

For the Scientist.

The Keokuk Limestone and Coal Measures of Pike Co., Mo.

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by R. R. Rowley, Curryville, Mo.

There is but one locality in the county at which I have noticed an outcrop of Keokuk Limestone, about six miles southwest of Curryville, on Indian Creek Only a few feet are here exposed which represents the base of the group, the *Archimedes* horizon. The layers of limestone are separated by thin partings of shale and the whole mass is well crowded with the remains of Bryozoa. The spiral axis of *Archimedes owenanus* are often very fine and the specimens sometimes reach a length of nine inches and occasionally are complete. The fronds are usually free from the axes but in a few cases have been found attached and give the collector some idea of a living *Archimedes*.

Other Bryozoa as *Coscinum*, *Fenestella*, *Polypora*. *Cyclopera* and *Cycloporella* are fairly common. Among Polyps are *Zaphrentis spinuloza*, *Z.* sp?. an *Amplexus*-like *Cyathophylloid*, a *Chaetetes*, a species of *Syringopora* and a fine *Aulopora*.

Of Echinoderms two undetermined species of *Batocrinus*, *Doricrinus gouldi* the detached spines of which are common, a *Barycrinus*, a crushed *Granatocrinus*, *Troostocrinus wortheni*, *Barycrinus stellatus*, *Oligoporus danae* and *Archoarocidaris keokuk*.

Of Mollucca there are but few imperfect species, a *Platyceras*, a large *Hemipronites*, *Spirifera pseudo lineata*, *S. keokuk* and *S. logani* and *Producdus semireticulatus*? Two or three imperfect pygidiums of a spine bearing Trilobite (*Phillipsia*) complete the fauna of the Keokuk Limestone in Pike Co., outside of some unidentified forms.

Coal Measures.—Along a branch about five miles north-east of Curryville, a few inches of a reddish clay shale, inclosing limestone nodules, are exposed, and a few species of fossils are found free in the bed of the brook. Among those picked up are the following species: *Productus*, *punctatus*, *P. semireticulatus*, *P. longispinus*, *Chonetes mesoloba*, *C. smithi*, *Spirifera camerata*, *S. kentuckensis*, *S. lineata*, *Athyris hirsuta*, *A. subtilita*, *Rhynchonella sp*?, a *Chaetetes* and large Crinoid columns, *Axophyllum rude*, *Retzia mormnne*, spine-like plates of a Crinoid probably *Delocrinus* and *Ptychostylus heterocostalis*(?).

In one of our past articles we mentioned the possible occurrence of the

Hamilton Group of rocks in our county, stating that Prof. Swallow, in the old Missouri Geological Report, claimed the discovery of such beds north of Ashley, Pike Co., Mo. In fact, Prof. Swallow said he had seen but one well marked outcrop of Hamilton rocks in the state and at the above locality, giving *Atrypa reticularis*, a *Spirifer* identical with a form from the Falls of the Ohio and a Cyathophylloid Coral as the means used in identifying the strata.

We promised the readers of the SCIENTIST to visit the locality, sometime, and give them the results of our investigations. We made the proposed trip in October and found the outcrop, picking up some small fossils but not a Hamilton species. The beds are Chouteau, yielding *Michelinio placenta*, and a small *Cyathophylloid*, abundant in the Chouteau near here. Single valves of a *Spirifera* near to *Marionensis* occur there as well as other Chouteau outcrops in the county. There is an *Athyris* characteristic of this series of rocks but we have never met an *Atrypa* and we doubt if this genus has ever been found above the Niagara Group in our county.

PHYSICISTS talk of the rate at which electricity travels; my contention is that electricity does not travel. In a closed circuit, such as that of a dynamo, it may be argued that the electricity forming part of the matter of the dynamo circulates round and round, but not so in the case of a lightning discharge or that of a Leyden jar, where there is no circuit, but only a path.

I think I am now in a position to point out a source of error which our physicists it appears to me, have fallen into, and possibly Maxwell himself also, they seem to have confused both electricity and light with energy; neither light nor electricity is energy: light, it is contended, does not travel from the stars through space, but simply energy, and such transmitted energy develops light when it comes in contact with matter; energy is also concerned in all electrical phenomena, and it is energy, not light, that travels at the rate of 192,000 miles per second.—*Varley*.

The next International Ornithological Congress will be held in Budapest, at Whitsuntide, Hungary, commencing May 17 and lasting four days. Arrangements have been made for several excursions which will start on the 21st. The Congress will be divided into the following sections: Anatomy, Biology, Economic Ornithology, Migration, Oology and Systemity. Further information may be had from the Hungarian Scientific Committee, at the above address.

AUSTIN CORBIN'S great game park near Newport, New Hampshire, contains 22,000 acres of hilly land, is stocked with buffalo, elk, moose, black-tailed deer red deer, caribou antelope and wild boars from the Black Forest of Germany The experiment is said to promise great results.

THE reddish appearance of the planet Mars is ascribed to a number of causes. Herschell thought it was on account of the color of the soil, others claim that the vegetation, unlike that of the earth, is red.

At the Spokane Falls exposition there is a lump of coal from the Roslyn mine containing 130 cubic feet and weighing 9,000 lbs.

The Scientist.

FORMERLY THE NATURALIST.

KANSAS CITY, FEBRUARY, 1891.

A Monthly Journal, devoted to all branches of

SCIENCE.

The Academy of Science, Pub. Co.,

Publishers and Proprietors,

Kansas City, - - Missouri

R. B. Trouslot, Editor.

Assisted by E. T. Keim, E, Butts, David H. Todd and Sid. J. Hare.

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AT the last meeting of the Academy of Science Mr. Chas. Dawson, one of its active members, donated to the Academy an extensive Mineralogical collection, many Geological. Archæological and other specimens, classified and neatly arranged in a cabinet. They may now be seen at the Academy's headquarters, No. 200 Baird Building. Steps are being taken to purchase bookcases for the Ferrel Library and also for the Volumns Mr. Lykins stands ready to donate the moment case room for their proper preservation is in sight.

THE great state of Kansas, the scene of many stirring events prior to and during the civil war, serves to bring out the best thought and intelligence of a people. The establishment of the State University and other educational institutions by the state, the liberal support and encouragement given to works of a statistical character speaks of the wise forethought of its founders. We have received a copy of Kansas Historical Collections, Vol., IV, 1886 to 1890, published by the State Printer. A very valuable work of reference containing a great amount of interesting matter put into permanent form for future use. The trials of the founder of the Historical Society are graphically given by Hon. D. W. Wilder, its President, who, in speaking of the powers of the Press, says :— "A united Pr ss can move Kansas, the World and the whole Solar System, and remains fresh and vigorous enough to tackle some other trifle the next day.

AUSTIN CORBIN'S great game park, near Newport, New Hampshire contains 22,000 acres of hilly land. It is stocked with Buffalo, Elk, Moose, Black-tailed Deer, Red Deer, Caribou, Antelope and Wild Boars from the Black Forest of Germany. The experiment is said to promise great results.

Barrows Golden-eye Again.

The supposed specimen of Barrows Golden-eye, taken last December, in the Neosho Valley, is declared upon examination by Col. Goss & Dr. Coues, to be an American Golden-eye, Dr. C, however admitting that the specimen is "somewhat equivocal." I based my judgment entirely upon Dr. Coues description of the shape of the head of the Golden-eyes, feeling sure that any identification based upon the plumage of a young bird might be wholly unreliable.

Dr. Coues says in his "Key, etc.," that the head of the American Golden-eye is "moderately uniformly puffy," while that of the Barrow is slightly crested on the front of the occiput.

Now this double cresting is very decidedly marked in the specimen described by me. Under this circumstance, I cannot feel the slighest chagrin in having declared it to be probably a specimen of *G. islandica*.

P. B. Peabody.

REVIEWS AND EXCHANGES.

Gems and Precious Stones of North America. A Popular Description of their Occurrence, Value, History, Archæology, and of the Collections in which they Exist, also a Chapter on Pearls and on Remarkable Foreign Gems Owned in the United States. By George Frederick Kunz. Illustrated. 336 Pages. Published by The Scientific Publishing Company, N. Y. City. Cloth uncut edges. Price $10.00.

As the Author states in the Introduction, this work is not intended either as a complete treatise on precious stones or on the science of mineralogy, but is confined more particularly to the occurrence of precious stones in North America.

Chapter I. On Diamonds, contains some startling facts. Usually the scarcity of any particular thing accounts for its value, but when we learn from this chapter that over nine tons of diamonds, valued in the rough at $250.-000,000 and after cutting at over $500.-000,000 have been taken from a tract of land "within a radius of a mile and a half" since 1867, in the South African mines, one would naturally suppose diamonds would soon become very common and cheap stones, never-theless there is no danger of diamonds ever being a glut on the country and unless some new field is discovered they will probably increase in price.

Chapter XII. Devoted to Pearls, is of especial interest as many hundreds of dollars worth are found each year in various parts of the U. S. "Strictly speaking" says Mr. Kunz "the pearl is not a precious stone at all nor a mineral but simply an animal product."

Chapter XVI. And last, defines precious stones, speaks of imports, watch jewels, stones for ornamentation of silver, furniture, interior decorations, etc., etc. There are 336 pages not including seven full page and one double page colored lithographs by Messrs. L. Prang & Co., of Boston, nor sixteen other full page plates.

Scattered through the text are more than twenty wood engravings so the work is excellently illustrated. Mr. Kunz of New York City, is gem expert with Messrs. Tiffany & Co., and special agent of the U. S. Geological Survey. The author was assisted by Holmes, Clark, Diller and Day, of the U. S. Geological Survey; Ward, Knowlton, Dall, Merrill, Wilson and Stearns of the U. S. National Museum

Prof Edward S. Dana and many others. The work comes so highly recommended by the scientific press of the country generally that it seems idle for us to undertake to say more in its praise than has already been said. We would respectfully refer the reader to the advertisement of this magnificant volume on third page cover of this magazine.

The Dictionary of Fossils just published by the Geological Survey of Pennsylvania is the most complete library for palæontologists ever published in three volumes. It meets the long felt wants of palæontologists generally and especially those who are not so fortunate as to have access to a good public library, or be able to buy the volumes required to determine the names of the fossils in an ordinary private collection.

It is alphabetically arranged and under each name gives references to publications first describing them; names of party making the description; also the geological group wherein found; and in most cases giving fine illustrations.

The three volumes of the Dictionary are uniformily bound in cloth and have about 1500 pages and 3000 illustrations. We are indebted to Mr. R. D. Lacoe for our copy of this valuable work on palæontology.—S. J. H.

Somewhere we have read that "A judicious and legitimate use of printer's ink was a certain road to wealth."

We have always realized the importance and necessity of persistant advertising. The art of advertising in years past, could only be obtained from dear experience. Now, however it is different. We repeat 'now it is different,' from the fact that recently, Uncle Sam's mail-man placed on our desk for the first time, a most appropriately named, artistically printed, and graphically edited little magazine, having the suggestive title of *Printer's Ink.*

Printer's Ink comes weekly, costs $2.00 per year, and with the interests of the advertisers at heart, and both eyes with open, accomplishes excellent results. Through no other source from so small an investment, could the expert advertiser, to say nothing of he who only advertises occasionally manage to derive such incalcuable benefit, as from the seventy-two crowded columns of *Printer's Ink.* They are constantly bristling with attention attractors, catchy eye-openers, taking suggestions and striking ideas of especial interest to the brain-worked and weary advertiser, from his ceaseless effort to present something new. Filled with the profoundest thought from the pens of the brainiest thinkers and writers of the day, *Printer's Ink* is not only instructive and entertaining but is a stimulant from which there can be no deleterious reaction. Once read, never without. It originated with and is published by Geo. P. Rowell & Co., advertising agents, No. 10 Spruce St., New York City.

As these gentlemen have had a reputation for honesty and fair dealings for more than a quarter of a century, it goes without saying that they are authority on questions pertaining to advertising and are thoroughly reliable.

Being extensive advertisers themselves, it is plain, they "practice what they preach." Extinct "fossils" and prehistoric firms are advised to leave them severely alone, for fear they might absorb an idea, and revive their ghost of a business.

A decided acquisition to the staff of the COSMOPOLITAN MAGAZINE is Mr. Brander Mathews, President of the Nineteenth Century Club. the well known litterateur who takes charge of the department of book reviews. The keen critical taste of Mr. Mathews, and his fine judgment in literary matters, will make his opinion valued in every household Mr. Mathews name, added to that of Edward Everett Hall, in charge of "Social Problems"; Murat Halstead reviewing "Current Events," and Miss Bisland with her European articals, gives the COSMOPOLITAN a departmental staff of exceptional brilliancy.

New subscribers to COSMOPOLITAN through THE SCIENTIST, can get both magazines for $2 60 while old subscribers to COSMOPOLITAN can secure it and THE SCIENTIST for $2.80.

With each month the reputation of THE CHAUTAUQUAN increases as a high class literary magazine adapted to the needs of practical people who think and crave more knowledge. It covers the field of literature in a most comprehensive and delightful way, discussing all great subjects of which the world is thinking and enlisting the best writers of the country in filling its pages. The splendid line of popular Readings on English History and Literature which is now running in the magazine is genenally conceded to be the most unique, comprehensive, and scholarly piece of historical work undertaken by a periodical. It covers the whole period of England's history and is prepared by more than twenty-five different writers.

CANANDAIGUA, N. Y., has a flourishing Mieroscopical Society. We are indebted to one of its members for a copy of the *Ontario County Times*, describing their last monthly meeting.

Minerology.

MISSOURI MINING INDUSTRY.

The following represents the amount of out-put of zinc and lead ore of various mining districts in Missouri for the week ending January 31st, 1890:

JOPLIN.

Zinc ore, 1,500,290 lbs. Lead ore, 188,060 lbs.

BELLEVILLE.

Zinc ore, 339,050 lbs. Lead ore, 4250 lbs.

WEBB CITY AND CENTERVILLE.

Zinc ore, 2,245,530. Lead ore, 267,-830 lbs.

Total, Zinc 4,084,870. Lead 460,140.

The vein of coal worked by the convicts at Lansing in the ground attached to the Kansas penitentiary is twenty-two inches thich. There are about 1,000 acres and as it has been estimated that each acre will produce 70,000 bushels it is apparent to all that convicts will not freeze for some time to come. During a year fully twenty-four acres are mined and already 145 acres have been exhausted. The entire output since the mines were first opened is nearly 11 million bushels. Last year 1,700,000 bushels were taken out.

Ornithology.

Extermination is going on at a rather rapid pace when one man succeeds in slaughtering 520 ducks in one day. Such is the record claimed by W. H. Dobson, of Havre de Grace, Md.

In Massachusett's the penalty for killing Quails out of season is $20 for each offense. If Missouri's legislature would make such a law for this state, and some scheme could be devised for its enforcement. we could soon supply our own markets and our sportsmen hunt at home.

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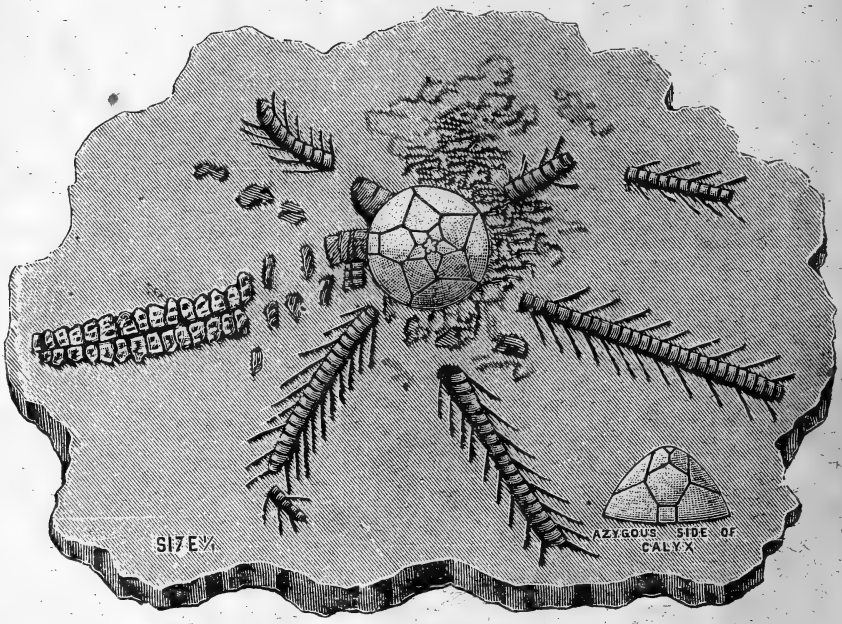
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THE KANSAS CITY SCIENTIST

ASTRONOMY. GEOLOGY. PHILOSOPHY. MINERALOGY. BOTANY. METEOROLOGY. ARCHÆOLOGY. ZOOLOGY. MECHANICS.

Official Organ of the Kansas City, Academy of Science.

VOL. V. KANSAS CITY, MO., MARCH, 1891 NO. 3

FORMERLY

THE NATURALIST.

CONTENTS.

ACADEMY OF SCIENCE PUB., CO., PUBLISHERS, KANSAS CITY, MO.

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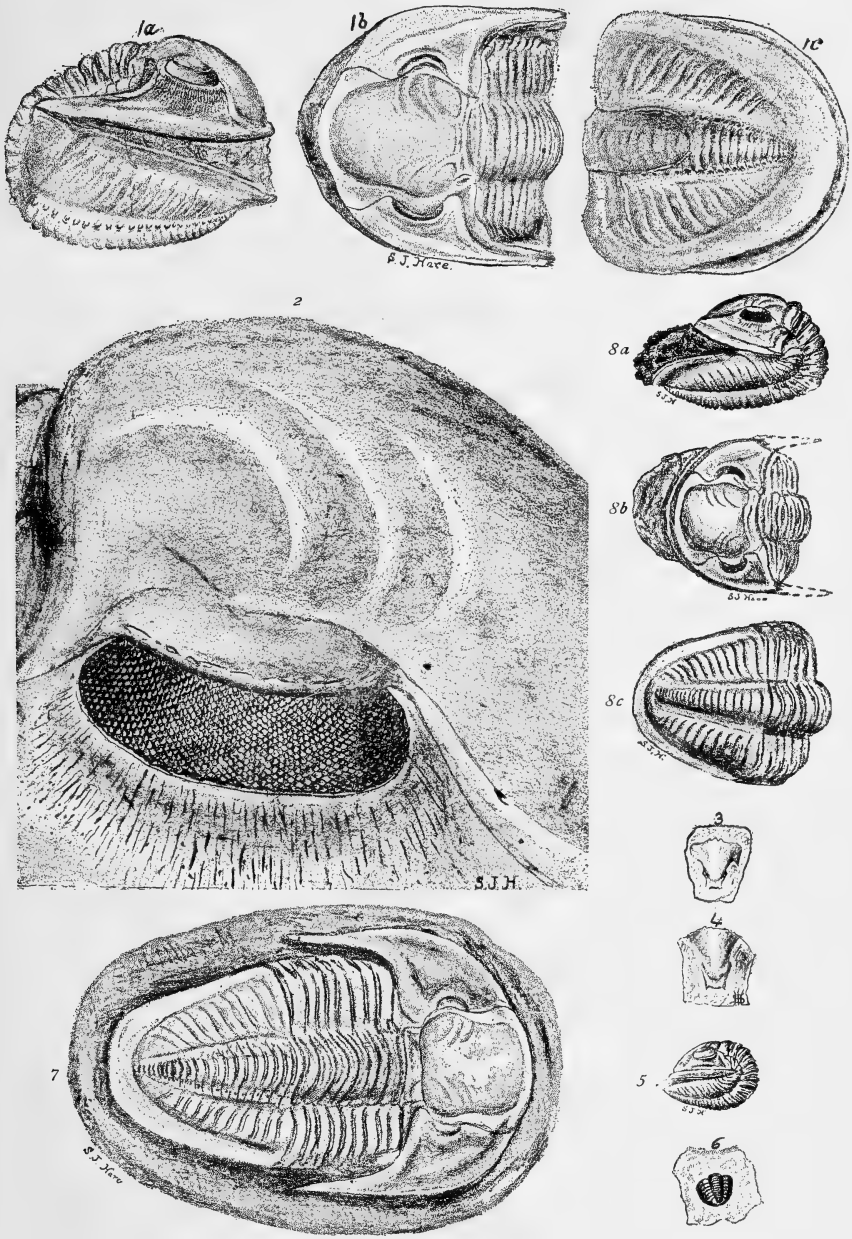

TRILOBITES

OF

UPPER COAL MEASURE GROUP AT KANSAS CITY, MO.

By Sid. J. Hare.

DESCRIPTION OF PLATE I.

PHILLIPSIA NODOCOSTATUS.

FIG. 1. a b c. A specimen rolled—slightly disconnected at line of thorax and pygidium, 1 c slightly enlarged.

FIG. 7. A specimen extended—crushed across cephalon and thorax making it wider than it naturally would be.

FIG. 2. Compound Eye enlarged to show lenses from Fig. 1 a.

FIG. 3 & 4. Hyperstoma found in same quarry as above.

PHILLIPSIA MAJOR.

FIG. 5. Small Specimen.

FIG. 8. a. b. c. Another specimen.

PHILLIPSIA CLIFTONENSIS.

FIG. 6. Pygidium natural size.

THE KANSAS CITY
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VOL. V. KANSAS CITY, MO., MARCH, 1891 NO. 3

FOR THE SCIENTIST;

Trilobites.

OF THE UPPER COAL MEASURE GROUP, AT KANSAS CITY, MO.

BY SID. J. HARE.

From the Palæozoic Rocks only do we secure these much coveted fossils. They came into existence during the Taconic, or early Cambran Period, and increas in numbers until the Calciferous, or upper Taconic group ; then decreased until the close of the Palæozoic time, when they become extinct.

In the St. John's group we find the first form of the Trilobite; from this group fifty species have been determined. In the Potsdam group of the lower Silurian seventy-two species have been identified ; the number of species increased up to the close of the Calciferous Group, where ninty-six are known to exist; from this time, they decrease in numbers, as follows :—In the Niagara group of the Upper Silurian, fifty species ; in the Upper Helderberg of the Devonian, forty-seven species; in the Hamilton, which follows, twenty-seven species; six species, in the Keokuck Group of the Sub-carboniferous; eleven species in the Coal Measures; and two species in the Permian, where we find the last forms of this beautiful fossil.

Of the order of Trilobites there have been described nearly six hundred species, belonging to sixty-nine genera and twenty-four families.

In the Coal Measure Group there are two genera. From the Upper Coal Measure rocks of Kansas City, three species have been identified, all of which belong to one genera; others may be found when a thorough search of this locality has been made.

The genus of this locality is the *Phillipsia*, to it belong the following species, *Phillipsia major*, *Phillipsia cliftonensis*, and a new species, which is here first figured, and described; here also is an illustration of *Phillipsia major* complete, which has heretofore generally been figured by the pygidium only, together with an illustration of the pygidium of *Phillipsia cliftonensis*.

PHILLIPSIA NODACOSTATUS, N. SP.

(*Nodo*, knotty ; *costatus*, ribbed.)

Plate, 1, Fig. 7 and 1 (a, b, c.)

General form, body elongate-ovate,

tapering, with margins rounding to posterior extremity.

Cephalon broad, semi-elliptical, being slightly flattened each side of the glabella; width twice the length, straight behind, with posterior lateral angles, terminating in long pointed, spine-like appendages, extending back to the last thoracic segment, and sometimes to the second axal segment of the pygidium.

Glabella, sub-ovoid, with greatest convexity about center of the palpebral lobe slightly constricted in front of eyes, and somewhat abruptly rounded in front; width, opposite center of eyes, equal to length; a distinct furrow separates it from the cheek, and passes around to the front.

The basal or posterior lateral lobes are sub-pyriform in outline, and are isolated by a well defined furrow, passing from near the center of the palpebral lobe, obliquely across, with a backward curve, to the occipital or neck furrow, each of which reach about one-third the distance across the base of the Glabella.

The second and third lateral furrows from the base are nearly parallel with the first, and extend about one third way across on each side, and are less distinct; the fourth lateral furrows are very faint and short, often not noticeable without a glass.

The occipital segment is well defined, lower, and considerably shorter in its transverse diameter than the glabella; strongly arched across, and projecting slightly back of the line of the cheeks.

Cheeks broadly marginate; compared with glabella and eyes, medium; sloping abruptly from the eyes into broad marginal furrows, which become obsolete on reaching the anterior lateral margin of the glabella, and dividing below the center of the eyes into two shallow furrows, the outer extending backwards almost to the end of the long posterior lateral spine-like appendages, while the inner furrow continues around and under the eyes to the posterior margin. The posterior margins elevated forming a rim, which is well defined by deep furrows, coresponding in line to the neck or occipital furrow, and continuing backward, and uniting with the lateral marginal furrows. The parts sloping from the eyes to the broad marginal furrows are beautifully marked with radiating stria and punctures, extending downward from the entire under side of the eye, and almost crossing the marginal and lateral furrows.

Eyes lunate, sub-reniform, moderately large, being about five-twelfths the length of the glabella, prominent, though not as high as the glabella, located about one half their own length in front of the posterior margin of the cheeks. Visual surface smooth and apparently polished, semi-transparent, showing faint outlines of the lenses beneath, when examined with a magnifying glass. On removing this semi-transparent crust which readily scales off, we find a finely marked compound eye (see Fig. 2. Plate 1. which is magnified sixty-four times from Fig 1a.) Each eye has forty-eight diagonal rows the central rows are composed of twenty hexagonal lenses.

The palpebral lobes, which rest on the eyes like lids, are separated from the glabella by a sharply defined furrow, the lateral edges rounding abruptly to the eyes and having a row of longitudinal depressions, parallel to the upper lines of the eyes (see enlarged figure of the eye).

Thorax about same length as cephalon, and somewhat narrower, distinctly trilobate; segments nine, mesial lobe prominent and arched. Lateral lobes flat to the knee angle of each segment, which is about the middle, thence sloping abruptly to the margin. Pygidium elongate, near-

ly one half the total length, elevated, semi-triangular, or even approaching the semi-elliptical; anterior width aqual to length; surface, smooth; margin broad, posterior width being about one sixth the length, but taper to one tenth of the anterior lateral extremities. Axal lobe arched in the center and slightly flattened at the sides, terminating with broad deep furrows; width of axal lobe about equal to lateral lobe without the border, and tapering to an obtuse termination, posteriorly. Annulations twenty-three, vertical on the side, but having a slight anterior curve on the dorsum where they are distinctly marked, becoming less pronounced on the sides, and terminating abdruptly on the margin of the broad longitudinal furrows. Each segment is studded with a single node at its extremities, on the margin of the longitudinal lateral furrows, thus forming a row of nodes along each side of the axal lobe. These nodes decrease in size toward the posterior, but the annulations become better defined. Lataral lobes curving downward to the broad margin; annulations twelve, forming a reverse backward curve, and becoming obscure in the broad margin.

The only difference betwen the pygidium of this species and that of *Phillipsia major*, by Shumard, is the row of nodes along each side of the axal lobe.

Dimensions: length, 2.4 inches; cephalon, 0.8 inches; thorax, 0.5 inches; pygidium, 1.1 inches. See Fig. 7, slightly reduced.

Locality: Oolitic limestone, layer 87 by Broadhead's general section of the Coal Measure rocks of Missouri.

Phillipsia major, Shumard.

Plate I. figures 5 and 8 (a, b, c.).

This trilobite was described by Prof. Shumard in 1858 from the pygidium only. Several complete specimens have been fund in the Upper Coal Measure rocks at Kansas City, and they are undoubtedly identical with Hall's *Proetus longicaudus* described in the 7th N. Y. Palæontology. Prof. Hall says that this specimen may ultimately prove to be a Carboniferous fossil, as its geological horizon was indefinite; it was found about thirteen or fourteen miles northwest of Toronto, in Greenwood County, Kansas. The writer made a geological examination of this locality, some two years ago, and obtained a number of characteristic fossils of the Upper Coal Measure Group, among them were *Myalina subquadrata*, *Lophophyllum proliferum*, *Fistulipora nodulifera*, portions of the *Delocrinus* a genus recently described by Miller and Gurley; all were obtained from the same horizon and locality as the trilobite in question.

Similarities and differences:-The number of annulations of the axal lobe in the *Phillipsia major* being twenty-three, while those of the *Proetus longicaudus* is twenty-two, which is not an unusual variation of the *Phillipsia major*, some specimens having only twenty.

Phillipsia major, width of the pygidium slightly greater than length, while in *Proetus longicaudus*, the width equals the length; of six specimens of the former examined, the following results were obtained: two, width greater than length; one, width equal to length and three width less than length.

Admitting these variations of the latter, and the corrected geological position of the former, *Proetus longicaudus* must be a synonym for *Phillipsia major*.

Phillipsia cliftonensis.

Plate I. Fig. 6.

This trilobite has been found in the Upper Coal Measure Group of Kansas City, and corresponds with the description of this species by Prof. Shumard; it is distinguished from *Phillipsia scitula*, by fourteen annulations in the axal lobe

of the pygidium, also by the lateral lobes and the margin, being separated by a shallow but distinct furrow.

FOR THE SCIENTIST.

The Walam Olum.

Some years ago Dr. Brinton issued as a portion of his "Library of Aboriginal American Literature" a volume entitled "The Lenape and their Legends,"—one of the most valuable of these monographs.

The *raison d'etre* of this book is the *Walam Olum*, or Red Score, of the Delawares, which is reproduced in *fac simile* with the Indian text and a new translation by the learned editor. It is preceded and followed by introductions, linguistic discussions and vocabularies that equip the reader, or rather the student, for the task of extracting both instruction and pleasure from this aboriginal chronicle of America.

What is *Walam Olum*? Its history, were it first put forth in our day, would condemn its authenticity at once among the self-constituted censors of such things at Washington. It was first made public by an outcast scientist named Rafinesque. He was, or claimed to be, intensely interested in American archæology and liguistics; but being poor, eccentric, slovenly in person, cranky in his views and a predecessor of Dr. Koch in the manufacture of a curative nostrum for phthisis, he was looked at askance by learned societies and compelled to pursue his investigations without the countenance or sympathy of scientific men. Moreover, when he publishid the *Walam Olum* his account of the manner by which it came into his possession was extremely unsatisfactory. "Having obtained," said he, "through the late Dr. Ward, of Indiana, some of the original Walam-Olum (Painted record) of the Linapi Tribe of Wapahoni or White River, the translation will be given of the songs annexed to each." Now it so happened that no such person as Dr. Ward is known in the early medical annals of Indiana and this was the occasion of doubts on the part of Dr. Brinton and his predecessors as to the veracity of Rafinesque and therefore as to the authenticity of his discovery. Rafinesque claimed in a later page that the *Olum*, or pictographs were obtained in 1820 "as a reward for a medical cure, deemed a curiosity and were inexplicable. In 1822 were obtained from another individual the songs annexed thereto in the original language; but no one could be found by me able to translate them." This seems to be a different account of the origin of the *Walam Olum* and threw an additional cloud of doubt over its genuineness. Besides this the copy possessed by Rafinesque was then, and remains still, unique among Indian relics. Surely a find so discredited in every way, (1.) By the character of its discovery. (2.) By the vague and conflicting account he gave of its discovery, (3.) By the absence of any other copy either entire or fragmenary, and of all allusion to such a remarkable specimen of aboriginal literature in the writings of other investigators much better situated to have seen it than Rafinesque; was scarcely worth the attention of scientific men! The doubts thrown on the authenticity of the Davenport elephant pipes seem trivial in comparison. Yet Dr. Brinton set about, in the true spirit of science, to examine these doubts and to decide, once for all, whether the *Walam Olum* was a forgery concocted by Rafinesque or a genuine Indian product. Perhaps he would have been justified in ignoring the subject altogether, on the principle that what appears to be false *a priori* is unworthy of an examination *a posteriori;* but becoming interested in a

relic which, if authentic, casts a ray of light on pre-Columbian times in this country he carried on an assiduous and careful inquiry which resulted in clearing Rafinesque from all suspicion in this particular and placing the *Walam Olum* among the authentic monuments of aboriginal America. It would require too much space to set forth the process by which these results were reached, suffice to say that Dr. Brinton was satisfied from internal evidence that it was genuine beyond question; and his authority does not need the support of a less competent corroborator.

The *Walam Olum* was originally painted on wooden tablets in a red pigment and consisted of a large number of pictographs, or mnemonic symbols, recording the wanderings and vicissitudes of the Lenape from some remote, but unascertained epoch, down to the coming of the white-men. It begins, like most primitive chronicles, with a sort of cosmogony in which a flood and an evil spirit figure. Dr. Brinton's translation of this portion is as follows:

At first, in that place, at all times, above the earth, on the earth, was an extended fog and there the great Manito was. At first, forever, lost in space, the great Manito was. He made the extended land and the sky. He made the sun, the moon, the stars. He made them all to move evenly. Then the wind it blew violently and it cleared and the waters flowed off far and strong. And groups of islands grew newly and there remained. Anew spoke the great Manito, a Manito to Manitos, to beings, mortals, souls and all, and ever after he was a Manito to men and their grandfathers. He gave the first mother, the mother of beings. He gave the fish, he gave the turtles, he gave birds. But an evil Manito made evil beings only, monsters, he made the flies, he made the gnats. All beings were then friendly. Truly the Manitos were active and kindly to those very first men and to those very first mothers; fetched them wives and fetched them food when first they desired it. All had cheerful knowledge, all had leisure, all thought in gladness. But, very secretly, an evil being, a mighty magicion, came on earth and with him brought badness, quarrelling, unhappiness, brought bad weather brought sickness, brought death. All this took place of old on the earth, beyond the great tide-water, at the first."

Then it proceeds to tell of "a mighty snake and beings evil to men," who resolved to injure mankind and of the great strife between them until the men "were finally driven from home, though they still struggled with their enemy. Then the snake brought in "three persons, he brought a monster, he brought a rushing water," and the men fled down the stream to escape the torrent and were rescued by "Nanabush, the strong White One," at the Turtle Island, whose "Manito daughter, coming, helped with her canoe, helped all, as they came and and came." Then the rescued people "on the turtle, like to turtles," prayed "that what was spoiled should be restored and the water ran off, the earth dried, the lakes were at rest, all was silent and the mighty snake departed."

This is the cosmogonal part of the record and it is all that we have space to present at this time. The remainder consists of a sort of itinery of the migration of the Lenape from some northern region across a frozen body of water, into the country of the Talegewa. From these, who were encountered in battle and, after much difficulty driven away, the Lenape learned to cultivate the soil, for at that time they knew nothing of the grain called maize afterwards so sacred in Indian legend and song.

It would be interesting to discuss the

probability of the Talegewa being the people called Moundbuilders, but this is reserved for a future occasion. Prof. Thomas thinks they were Cherokees.

The portion of the *Walum Olum* presented above possesses all the elements of poetry. I have heard it read in the original tongue by an educated Wyandotte and in his mouth it sounded like a sonorous and solemn chant. Its subject is poetical and the treatment distinctly so. Put in English meter it is sufficiently imaginative and grave to be far above contempt as a mere poem. I have roughly thrown this part into blank verse to illustrate this fact and will close by presenting my metrical version:—

I.

When time began there was a place where grew,
As ages passed, a mist whose spreading shroud
Concealed both earth and sky, and therein dwelt
The Manito Almighty. There unseen,
Eternal, omnipresent, lost in space,
The Manito existed. Then he made
The wide earth, and the firmament above.
The sun, the moon, the stars, and caused them all.
To move in order. Then a great wind rose,
And blew the fogs away and far and strong,
The waters flowed, and groups of islands grew
Above the waves and, steadfast, there remained.
And then again the mighty Manito
Spoke to all beings, Manitos and men
And unembodied souls; to mortals still
Creator and preserver. From his hand
The primal mother came of all that live,
And also fish and turtle, beasts and birds.
But evil creatures, monsters, flies and gnats,
Were by an evil Manito first made.
In those days all were friends; the Manitos
Were good to men, to those first men of all.
They brought them wives and when man wished for food,
'Twas furnished them. In that primeval age
Grief was unknown, unknown was weary toil
And mirth and cheer ruled all man's happy days.
But now there crept in secret upon earth
An Evil One, a mighty sorcerer
And brought with him a thousand miseries,—
Brought wickedness and strife and sharp distress,
Bad weather, too, he brought, disease and death.
All these things happened on the primal earth,
Beyond the great tide-water in old days.

II.

Long, long ago, there was a mighty snake
And other beings harmful to mankind:
And this great serpent hated man, and sought
In all ways to torment him, and both sides
Did evil, each to each; unceasingly
They warred, till at the last the men o'erthrown,
Fled from their homes; yet fought on still
Against the spoiler. Then the snake resolved
To do the utmost harm he could to man
And so he brought three beasts, and with them came
A monster and a torrent; through the hills
The floods rushed down ahd ruined all the land.
At that time on the Turtle Island walked
The Strong White One, Manito, Nanabush,—

Kind parent of all creatures and of men,—
There walking and creating he first made
The turtle. To this island thronging down
Through flood and shoal, all human beings fled,
Braving the fishy monsters of the stream,
By whom some were devoured. With her canoe
The Manito's kind daughter aided all
Who in successive swarms, approached the shore;
And Nanabush helped also, parent, friend.
Of all that live of turtles and of men.
So thronged they on the Turtle Island till
They seemed to be all turtles. In great fear
They prayed that what was spoiled should be restored;
And then the deluge vanished and again
The earth was dry; the restless waters ceased
Their noisy tumult; and, as peace came down,
Swiftly and far the mighty serpent fled.

WARREN WATSON.

NOTES BY THE WAY, NO. 3.

TO THE MEMBERS OF THE A. OF S.

A few rambling notes on the far-away southwest are submitted.

By the southwest, I mean all that portion of the state of Sonora, Mexico, north of the Sierra del Nazareno and all of the territory of Arizona.

Probably no country in the world presents so many sharp contrasts in nature as does the southwest.

The first impression of this country, to most people, is a bad one. Judged by the same standards that are applicable east of the Rocky Mountains, there is but little to change from first impresstoin. But this country should not be judged by the same standards that are justly applicable farther east.

As a general proposition, all of this country is a desert. The exceptions are a few timber belts in the mountains and the small portions of the mesas and higher valleys that have been irrigated. The exceptions probably do not constitute one per cent. of the entire area.

There is very little timber in the country. It will be remembered that in my notes on Colorado and New Mexico, I called attention to the fact that good timber is seldom found below 6000 or 7000 feet above sea-level. The same law of timber distribution obtains in the southwest. Inasmuch as there are very few high mountains, timber is scarce. There is much mesquite, palo verde, iron-wood, grease-wood, sage-brush and other scrubby growth that is suitable for fuel, but commercial lumber is limited in both quantity and extent.

One may travel for days in one direction and see no other trees so large as the giant cactus, called by the natives, sequoyah. This plant, in Arizona and Sonora, often attains a height of forty feet, and occasionally nearly, or quite, doubles these figures. I measured one on the first mesa of the Magdalena mountains about thirty miles south of Nogales, in Sonora, that was 68 feet in heigth. I afterwards saw others much taller. The diameter of these giants is often as much as three feet and occasionally as much as four feet.

Among the many interesting cacti in the southwest, the "niggerhead" stands well up in the list. This cactus is either spherical or cone-shaped. It looks like an immense pin cushion. Its height and diameter are about equal and are sometimes as much as five feet. This plant has an interior resorvoir in which it stores up water. It is claimed by old plainsmen that the water stored by these

cacti has saved many from perishing of thirst.

Another interesting cactus is called the cane cactus because "tenderfeet" collect so many to take east to be used for canes or walking sticks. The natives call this species ocotille (pronounced o-ko-tee-yi.). Its blooms are a beautiful flamingo red. They appear in all their glory from the middle of January till the middle of February. The blooms come out at the tops of the plants which are usually from eight to eighteen feet tall. The flowers remind me somewhat of those of the magnolia, but they are only about one-third to one-half so large.

Another interesting species is the night-blooming cereus—cactus cereus. I saw a few specimens on the Rio del Rey in Sonora, last August, but they were not in bloom.

The prickly pear—a species of opuntia—is sometimes planted in the southwest for a hedge. At San Pedro, Mission, in southern California, is such a hedge. It is claimed that it is 171 years old. Some of its leaves are eleven feet in diameter and from four to six inches thick.

One reason why the cottonwoods of the southwest are so small is because they grow along the low valleys where the channels of the streams are almost constantly changing from bluff to bluff. The current seldom gives them more than four or five years in which to grow, consequently, they are never large.

In Colorado, the cottonwoods, as I observed in Notes No. 1, are mostly narrow leafed, and are much like the "quaking asps" or aspens. In the southwest, the cottonwoods are much like those seen along the Kaw or Missouri rivers.

The palo verde is a strange tree. It looks somewhat like the box-elder—the *Acer negundo*. Its twigs and small branches are always a bright green. At a distance, this tree resembles a cedar or juniper. The natives claim that "it never blooms, never puts out any leaves, yet it is always green." But Mr. Lawrence, of the *Journal*, and myself found a tree of this species in leaf in January, 1889. It was in Redbank Arroyo, San Pablo Mountains, about fifteen miles above the mouth of the Gila river. The tree was about 14 inches in diameter. Its leaves were about as large as wheat grains and shaped much like the ears of mice. I have never seen this interesting tree in bloom.

There are four different species of plant in the southwest that are called sage brush. Two of these undoubtedly belong to the *artemesia* or sage brush proper. The other two are entirely different. One of these last is the "broom sage." It looks, when in bloom, somewhat like the golden rod. But its stalks are much smaller and they grow in clumps of from thirty to sixty from one root.

The remaining species is seldom above twenty inches in height. It has large, white, sessile leaves and, if I remember correctly, fluted stalks. At a distance of a few rods, it resembles the ice plant.

The so-called iron-wood, already mentioned, is a fine tree. It is claimed that for fuel this wood is equal to good soft coal, bulk for bulk. It does not seem to be right to burn it for fuel. It is dense and fine grained. It is probably a species of mahogany, and would, no doubt, make a fine cabinet wood.

I have never had a manual of botany with me in the southwest. I mean to classify some of these strange plants as soon as I can and give the result to the Academy.

The timber of the southwest is principally in the Mogollon, Black, Chiribuahua, San Nazareno and Magdaleno mountains.

I have said this is a country of sharp contrasts. We may travel for days and conclude the country is an irreclaimable desert. During the whole time we may see nothing green. Five years later we may travel the same route. Occasionally we will pass an "improvement" where some ranchman has settled and has lead out a stream of life-giving water to his grounds. What a change! A small piece of desert has been converted into a paradise. Nothing of which we could have an earthly conception could be more beautiful than such a spot in the hands of a man of industry and correct taste. Fig, lemon, orange, olive, date, palm and other kinds of semi-tropical trees abound in verdant splendor. Grapes and other delicious small fruits are abundant on every hand. Stretches of alfalfa, alfarca and other forage plants delight the eye, while beautiful flowers appeal to the esthetical nature. But step one rod outside of the irrigated limit and all is changed. The yellow and brown of the desert, in their endless monotony, reign supreme. What sharp contrasts does nature present.

When one behold the capabilities of this desert soil, he cannot but regret that water is so scarce.

Most of the mountains are so low that they do not condense much moisture. There are no springs, no running brooks, no shady pools and no water, in any form, in the low mountains, consequently, but little vegetation exists. Outside of the upper portions of the American valley, between the Black and Mogollon mountains, the upper portions of the Hasyampa, Verdi and Gila rivers in Arizona and the valleys of the Magdalena and Nazareno mountains in Sonora, there is practically none of the southwest adapted to grazing. The grazing lands probably constitute about ten per cent. of the entire area.

No grass of any consequence, grows in the two principal valleys of Arizona. These are the Colorado and the Gila. Below Tucson, but little grass grows in the Gila valley. I never saw any place in the entire Colorado valley where grass was sufficiently abundant for live stock to thrive on it. Between Castle Dome mountain and Laguna, a distance of some twenty miles, I saw a few hundred head of cattle in January 1889. The Colorado valley on the California side, between these points, widens out to from three to six miles, yet throughout all this expanse of valley, it would take several hundred acres to graze one cow. While exploring this valley, our party was compelled to carry feed, barley, for our seven head of horses and mules. We were there in the hight of the grazing season at that!

Possibly artesian wells may help to reclaim this country. The hundreds of these wells that have been sunk in southern California have done much to irrigate and reclaim that country.

The Martin well in the middle of the Journado del Muerto—Journey of Death—in New Mexico, is a fine example of what can be done with artesian water. Around this well is a beautiful oasis. Here the scene of the climax to the most beautiful frontier story I ever read is laid. The title of the story is the same as the name of the desert, "Journado del Muerto." The story was written by Capt. J. W. Steele, now of Topeka.

It is true that some of the valleys of

the southwest can be irrigated from ditches leading from the rivers, but the erea that can be thus "brought under the ditch" is comparatively small.

Much of the arable land is too high to be supplied from streams and much of the valley land overflows in times of freshets and the irrigating ditches are filled up or entirely destroyed.

This leads to the observation that when it does rain in the southwest, the water comes down in torrents. Last August, I was assured by a conductor, while on the Mexican Central railroad, that, a few days before, he saw a wave of rain water roll down over a mesa twenty feet high i. e. the wave was twenty feet high. Be that as it may, it was sufficiently high to cut out, at one stroke, several miles of track and followed down this track forty-two miles from Benson, Arizona, to Nogales, Sonora. More than half of the railroad track for the whole forty-two miles was washed out. It took two days to make the trip going and the same returning, fare $24 each way.

The company was unable for 29 days to get a train over the track.

The country, in Sonora, had been damaged by the floods as far south as Magdalena. But thirty miles west, on the opposite side of the Magdalena mountains, there had been no rain for nearly three years.

Southern Arizona had a bad flood at the time of my visit in January, 1889. Before this, there had been no rain for twenty two months.

The best agricultural portions of Arizona are in the Salt river valley near Phœnix, on the upper Gila between Tucson and Gila Bend and on the lower Hasyampa river.

The Mohawk valley which is an enlargement of Gila valey above Gila Bend is a famous farming country. Between Tucson and Antelope Gap is a mesa or table land about three times the size of the state of Rhode Island, that would, no doubt, be a fine farming country if it could be irrigated. It is apparently as level as a floor.

An eastern firm has undertaken to reclaim this entire area, but I cannot see any feasible plan by which it can be done.

The mineral resources of Arizona are only partly developed. In the southwestern part of the territory near Ehrensburg is the famous "Vulture" gold mine that has yielded millions of dollars in rich ore. It was located by J. D. Cusenbary of Kansas City, who superintended it for nine years. From 600 to 1200 men are employed at this mine. About fifty miles southeast of the "Vulture" is the famous "Centennial" located by Mr. Cusenbary in 1876.

There are valuable mines near Phœnix, Globe, Tombstone and Prescott. The best undeveloped mineral country that I have seen in the territory, judging from surface indications, is in the Music Mountains, in the northwestern part of the territory, north of the Atlantic and Pacific, Santa Fe railroad. Hackberry is the nearest station, being about forty miles from the mining district.

Arizona has the only paying copper mine that I know of in the United States outside of the Lake Superior region. Possibly I ought to except the "Star" mine about fourteen miles from Albuquerque, New Mexico.

The placer mines of southern Arizona and southeast California are juts

beginning to attract the attention of capitalists.

The writer and four associates were pioneers in this placer field. They located 2200 acres of these placer deposits.

Three or four other companies are now in the field.

Before closing, I must briefly notice the fauna of the southwest.

With few exceptions, I noticed nothing different from what has been mentioned in previous notes.

The Gila monster has been described by several late writers. I cannot believe, however, that it is as venomous as newspaper writers and "other romancers" have generally claimed.

A Mexican who traveled with us ten or fifteen days, Jose Marie Mendosa by name, told us, one night, how the Gila monster originated As it shows evolution by retrogression, I give it as something new in natural history.

Before any Mexicans or Europeans lived in the country along the Gila, a padre, priest, started from Sonora to visit the Indians of Arizona. He was lost, and wandered for days on the desert. At length he came to an Indian, a Papago, near what is now known as Antelope Gap. He asked the Papago for a drink. Although the padre was nearly famished, the Papago refused to part with any of his "cantino del aqua" canteen of water.

The padre pronounced a curse on the Papago who immediately fell to the ground and was changed to a Gila monster. Since then Gila monsters have been more or less abundant all along the Gila river in the Papago country, but no where else.

When the story was finished, I said, "Jose, you do not believe such a story as that?" "O, si, senor!"

There seems to be no doubt in the mind of Jose on this subject, so I leave him and the members of the Academy to settle the matter as they best can.

The most interesting animal, perhaps, in all the southwest is the civet cat. Many miners tame this cat and teach it to catch rats and mice. I saw one run from one wall of a cabin to the opposite wall by passing along the joist. He ran very swiftly, but with his back down like a fly on a ceiling. His movement was so noiseless and swift that he captured his prey—a very much surprised mouse.

As is well known, the mountain lion, a species of puma, the cougar and two or three species of bear are more or less common in the southwest.

But there is one thing that can scarcely fail to be noted by the observer of nature in this country. This is the absence of birds and insects. Occasionally, an eagle or vulture may be seen in the distance soaring from peak to peak. Besides the desert quail, one may travel for days and not see a bird.

One chilly night in January, I heard several insects buzzing around my head after I had rolled in my blanket for the night. The air appeared to me to be freezing cold, but, of course, it was not. I was much interested in an insect that wanted to be so sociable on such a cold night, so the next morning, I asked Jose, our oracle, what made the buzzing noise. He looked wise and said in Spanish, "winter mosquitoes, senor." It is very convenient to have an expounder of nature with you like Jose. In fact, I would to-day be in the dark regarding the origin of the Gila monster but for him.

But being of a somewhat skeptical turn of mind, I investigated further and found that the "winter mosquitoes" are large, beautiful, "silver-winged" flies. They are about as large as the common green-headed horse-fly.

The arachnidæ, in the southwest, are represented by the huge, black tarantula and several species of spiders, but I do not remember seeing a scorpion, centipede or any other representative of the myriapoda, although I am told that this order is well represented.

EDWIN WALTERS.

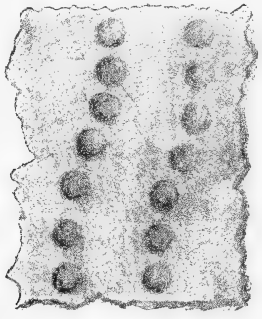
Kansas City, Mo., January 26. 1891.

FOR THE K. C. SCIENTIST.

Foot-prints of New Species of Amphibians in the Upper Coal Measure Group of Kansas City, Missouri.

BY EDWARD BUTTS.

The following is a continuation of the description of recently discovered foot-prints in rock number ninty one of the Upper Coal Measure Group of Kansas City, Missouri.



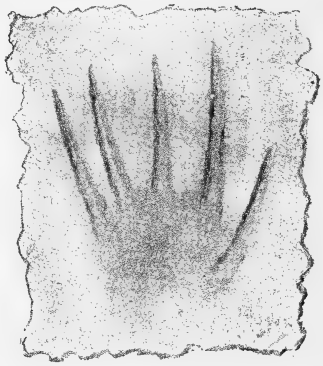
Genus—*Punctatumvestigium.*

(Ety. *Punctatum,* dotted; *vestigium,* trail.)

Two parallel rows of dot-like impressions, equi-distant longitudinally and placed at right angles on tangential lines.

Species—*Punctatumvestigium circuliformis.*

Two rows of dot-like impressions parallel and distant laterally, six-eighths of an inch. Each impression is circular form and five-thirty-seconds of an inch in diameter. The longitudinal distance from center to center is one quarter of an inch; midway laterally is the impression of an occasional dragging appendage.



Genus—*Notamphibia.*

(Ety. *nota,* mark; *amphibia, amphibium.*)

Foot-prints equi-distant with five toes in each print; toes long and slender compared with size of foot and ramifying forward.

Species—*Notamphibia magna.* (*magna,* large.)

Five long slender toes averaging seven eighths of an inch in length; total length of foot one and three-eighths inches; width one and one-eighth inches. The toes project forward with slight ramifications. Stride, six inches.

Kanopolis, a town over in Kansas, is happy over a 240 foot vein of salt recently struck.

The Scientist.

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ACCORDING to the recent census Bulletin of the population of the United States, the average centre lies near Greensburg, Decatur Co, Indiana.

As we go to press the sad intelligence is received that Colonel N. S. Goss, state Ornithologist of Kansas, dropped dead of heart disease at the depot in Neosha Falls, at 9 A. M., March 10th in his 65th year. The Colonel was an indefatigable collector and his extensive Ornithological collection, which now falls to the state of Kansas was one of, if not the finest private collection of the kind in the United States.

Our limited space will not permit of a more extended mention of the life and labors of this great and good Ornithologist.

MR. ARTHUR WINSLOW, State Geologist, has issued the 4th Bulletin of the geological survey of Missouri which consists of the description of one new genus and forty two new species of crinoids from the lower carboniferous of the State, by Mr. S. A. Miller. The species are divided as follows:--

Actinocrinus	1
Barycrinus.	2
Belemnocrinus	1
Cyathocrinus-	2
Dichocrinus-	2
Dorycrinus-	2
Forbesicrinus-	1
Missouriannus	1
Platycrinus-	23
Poteriocrinus	1
Rhodcrinus-	1
Scaphocrinus	2
Symbathocrinus	1
Zeacrinus-	1

Missouriannus being applied to the new genus.

The Maryland Yellow-Throat.

Out of the host of warblers that yearly visit us in the spring, *en route* for their summer breeding-grounds, only a very few make this the limit of their northern flight, and condecend to breed among us.

Going into the woods in the latter part of May, after the immenes tidal-wave of warblers has passed us by, we may rest assured that the warbler-voices we now may chance to hear, are the voices of those warblers which will remain with us for the season.

Prominent among the utteaances of these resident warblers, as one enters the woods in the last days of May is the simple, pleasing ditty of the Yellow Warbler, the more elaberate music of the Chesnut-side, the drowsy *buzz-uzz-uzz* of the Golden-winged Warbler, and strikingly in contrast to this last, the loud *tackle-me, tackle-me tackle-me* of the Maryland Yellow-throat.

These two last mentioned Warblers are most at home in low and swampy regions, and here their respective songs, so strikingly in contrast to each other, and so in keeping with the swampy surroundings, may be heard thoughout the day:–the Golden-wing's so full of drowsiness as to indicate that the singer is just on the verge of falling to sleep, and the Yellow-throat's so loud and full of spirit and activity as though the singer had but one end to accomplish, and that to keep the Golden-wing awake.

Particularly is the swamp and the marsh the home of the Maryland Yellow-throat, you scarcely find him elsewhere. Let him find a swampy, boggy, peat-bed, abounding in stagnant pools and moquitoes, and he is in his element.

I was wandering about just such a marshy region as this one morning at five o'clock in search for nests of any kind, when I found my first nest of *Gleothlypis*. It was in the last week of May and I had come out from town at 4.30 A. M. on my bicycle, to see what the recesses of this swamp and adjacent woods might reveal.

Water was on every hand and I chose the higher, grassy elevations along which to pursue my way.

I had just leaped over a fence, and landed, both feet in a ditch of water up to my hips, filling my rubber boots to the overflow point; and chiding my luck, I was turning my water-soaked footsteps toward the highway, when, aha, a tiny, *pink-footed* creature, slipped out from a tussock of grass at the base of a little bush, a few yards from me, and flitted into the adjacent shrubbery.

Now, contrary to the custom in vogue among most collectors in writing about their adventures I am not going to relate how "I flew to the spot" and "examined every inch of ground" "in every direction" and "finally found the nest" which contained five of "the most beautiful eggs of this species that I had ever seen." No, nothing of the kind. I merely found the nest;whether it were an easy or a difficult task it matters not,-and in the nest were five eggs of the Maryland Yellow-throat (for such the nest proved to be),and although the eggs are perfect gems of beauty, I have not the slightest doubt that there are hundreds of sets of eggs of this species in other collections just as pretty, and doubtless, some more so, than this.

I now have in my collection, a nest

eggs, and female bird, a pretty combination surely, but some way the nest and eggs do not look nearly so well as when tucked away in that tussock of grass at the foot of that little bush, shielded above by overhanging grasses, and dampened and cooled beneath by the nearness of the water, which had fairly soaked the nest. And someway the form of the mother bird is not, by far, so pert, nor does the golden tinting of her glittering throat glow with half the warmth it did when its possessor was flitting nervously about her boggy home to see why come I there.

And where is he, her partner? Perhaps, e'en now, 'mid the bogs and quagmires of some southern clime, he is mourning the fate of his sweet young bride, his mask of black most appropriate to his mourning morning.

But never mind, my sorrowing migrant, be aware of this much, thy pretty bride and treasures five have not fallen into unsympathyzing and thoughtless hands. No, never, e'en while I took them, I felt the meaning of it all. And know ye this, that by the taking of them, the captor has been taught much of Dame Nature that he did not know before; and who knows, but in learning more of Nature he has been drawn nearer Nature's God.

And so, cheered by these thoughts, can you not, my golden-throat, find courage to sing with unfaltering lips once more, that beautiful ditty of thine and may not these northern wilds, now desolate with winter's frost, be enlivened and inspired again in the spring by thine encouraging *weech-a-tee, weech-a-tee, weech-a-tee?*

NEIL FRANKLIN POSSON, MEDINA, N.Y.

THE GEOLOGICAL BUREAU.

OPERATIONS OF THE SURVEY DURING THE MONTH OF JANUARY.

State Geologist Arthur Winslow has submitted to Gov. David R. Francis, chairman of the board of managers, bureau of geology and mines, the following statement of the geological survey during the month of January:

"The progress of the work up to the beginning of this year has been presented to you through my biennial report. Since that time only such field work has been done as was necessary to complete those divisions of work which were included among the operations of the past season. Thus, in Jackson county some little field work was done to complete the examination of the clay and building stone industries of the western counties, and in Randolph, Howard and Lafayette counties instrumental levelling was done in order to determine the altitudes of various coal beds. But the bulk of the work during the past month has been in the office where the members of the survey are engaged in platting the results of surveys made during the past summer and autumn. In addition, we have been busy correcting the proof of bulletin No. 3, and in preparing the manuscript of my biennial report and of bulletin No. 4, for the printer. Bulletins numbers 2 and 3 have been printed and about 1,000 copies of each have been disributed. Bulletin No. 2 is a bibliography of the geology of Missouri, the manuscript of which was prepared and donated to the survey by Mr. F. A. Sampson of Sedalia. It is a valuable work of reference, and will prove of great use to all who are interested in the geology of Missouri and her minerals. Bulletin No. 3 contains papers on the clay, stone, lime and sand industries of St. Louis city and county, and on the mineral waters of Johnson, St. Clair, Henry and Benton counties. These papers contain a mass of facts concerning the subjects to which they relate, in addition to statistics of production. They are how-

ever, provisional publications, and the results of analyses and tests now in progress, together with other matter not yet ready for presentation, are reserved for the final report on these special subjects which we hope to prepare for this year.

In the laboratory analyses of clays and mineral waters have been prosecuted and 136 determinations have been made. In addition, a number of substances sent in by various citizens of the state have been determined and reported upon.

It gives me pleasure to be able to assure you herein of the unabated interest in the operation of the survey, as evidenced by the numerous applications for attention which are received at this office from many parts of the state. But, though it is gratifying to witness this exhibition of interest, it is deplorable that the means of the survey have not been sufficient to adequately satisfy these applications.

Some counties or sections of the state may feel themselves slighted; whereas did they know the circumstances of the case, they would recognize that considering the short period of existence of the survey, the limited means at its disposal, the magnitude of the area of the state and the great importance of many of the mineral deposits it is impossible that we should have met more than a fraction of the demands which have been made upon us. Work of one character or another has been done in nearly sixty counties of the state, and comparing both the quantity and the quality of our product with those of other surveys, I find that the result is in every way creditable. I wish to take this opportunity of presenting this explanation, and wish further, to add that there has been no intention to slight any county in the planning of the work, nor is there any failure to appreciate the importance, geologically, of those areas which remain comparitively untouched. We simply could not begin everywhere at the same time, nor could we possibly expand over the whole area during the past year, we had to begin somewhere, and we have done so with a consideration of the interests of all and with the intention of reaching all parts before any subject of work is completed.

I further take pleasure in calling your attention to the fact that the existence of the survey and its work is becoming widely known, and that we have many applications from individuals and companies throughout the country for information and reports concerning the mineral deposits of the state. The data which we have already collected enables us to answer some of these inquiries to the satisfaction of the applicant and to the advantage of the land owners of the state. As the work progresses we shall be able to do this still more effectively, and the bureau will thus become an invaluable department of the state government, where the investor, the home seeker, or the manufacturer can obtain authoritative, official and scientific information concerning the natural resources of the state, and where the resident and property owner in the state can secure reliable advice as to the value of the mineral substances which may exist on his land."

A MASTADON tooth weighing seven pounds has been unearthed at Mouson, Ia.

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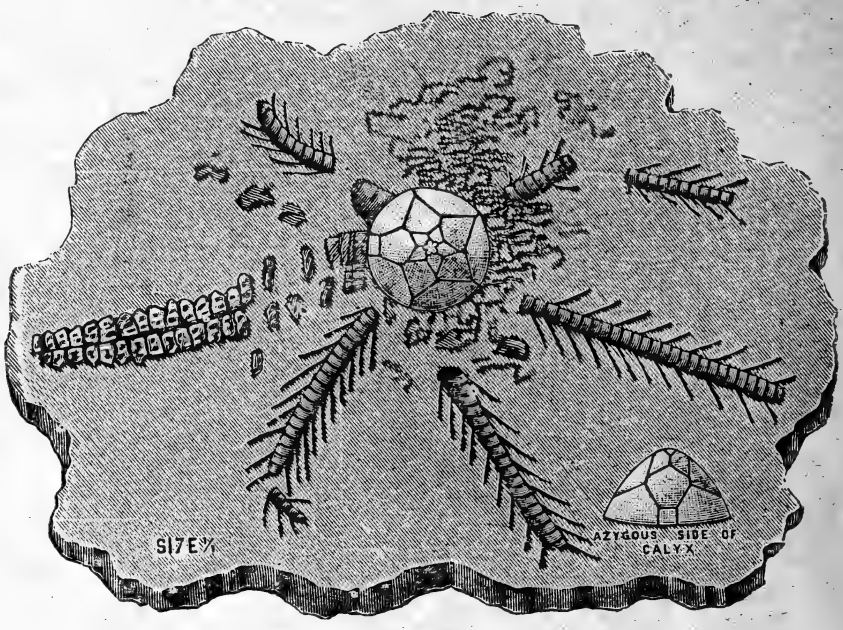
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Official Organ of the Kansas City, Academy of Science.

VOL. V. KANSAS CITY, MO., APRIL, 1891. NO. 4

FORMERLY

THE NATURALIST.

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KANSAS CITY, MO.,
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Publishers.

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—FOR—

The Scientist.

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Published Monthly at $1.00 per year; Foreign countries $1.10; Single Nos. 10c.

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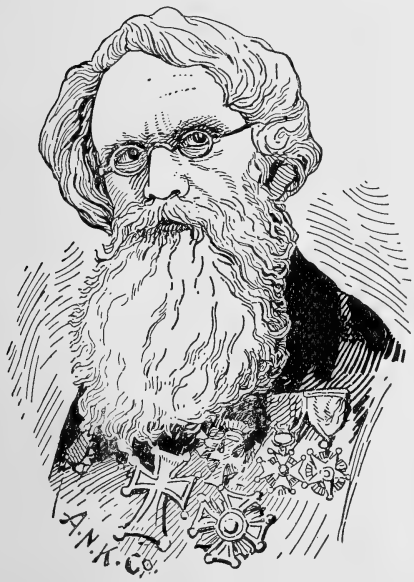
VOL. V. KANSAS CITY, MO., APRIL, 1891. NO. 4

Read before the Kansas City Academy of Science

Reminiscences of Prof. Morse, Prior to the Invention of the Telegraph and of His Record as an Artist.

BY S. F. B. MORSE.



A great deal has been written from time to time about the late Prof. Morse and his experiences as the inventor of the telegraph also brief sketches of his life and work as an Artist, so that I doubt very much if it lies within my power to say anything of general interest which has not already been made public, particularly as I am just at this time separated from my own collection of letters, books and general memoranda which would if accessable refresh my memory. However, Prof. Morse posessed an individuality peculiarly his own, and his life throughout was full of interesting incident and experience.

His father the Rev. Jedediah Morse was born in Woodstock, Conn., 1761. Entered Yale in 1780, graduated in Theology in 1783 and was licensed to preach the same year. He it was who wrote the first American Geography ever published and for many years it was the standard Geography of this country. He also established the Boston *Recorder* and was one of the founders of the American Bible Society and the American Tract Society. He is described as a man of genius, not content with what *had* and *was*, but originating, and with vast executive ability combining the elements of prudence. Dr. John Todd said of him: "Dr. Morse lived before his time and was in advance of his generation, he was a

Projector, Author, Founder and Inventor." Dr. Elliot speaking of him said: "What an astonishing *impetus* that man has." President Dwight said: "He is as full of resourses as an egg is of meat." Daniel Webster said: "He is always thinking, always writing, always talking, always acting."

There were eleven children born to Dr. Morse and his wife, only three of whom survived. These were, Samuel Finley Bruse, Sidney Edwards and Richard Cary, all three of whom lived to old age and were prominent in the Scientific, Literary and Social world.

Richard Carey Morse was born 1795. Entered Yale in 1808 when but fourteen years of age and graduated in 1812, the youngest member of his class. He was amanuensis for President Dwight until 1814 and died in Bavaria, Germany, in 1868 after a useful life in the Presbyterian Ministry.

Sidney E. Morse was born in 1794. Entered Yale in 1805 when but eleven years of age and graduated in 1811. When only seventeen years of age, he wrote a series of papers for the public press which were acceptably published, on, "The dangers from undue multiplicity of new states." In 1823 he, (with his brother Richard,) established the New York *Observer*, which is still one of the leading religious newspapers. In 1839 he produced the new art of "Cleogorphy" for printing maps on a common printing press. Later he invented the "Bathometer," an instrument for rapidly exploring the depths of the sea. He was a profound scholar, an able mathematician and a genial companion; he died in New York in 1871.

Samuel F. B. Morse was born in Charlestown, Mass., at the foot of Bunker Hill, August 27th, 1791. At the time of his birth, Dr. Belknap of Boston in writing to Postmaster General Hazzard of New York said:

"Corgratulate the Monmouth Judge (Morse's Grandfather) on the birth of a Grandson. Next Sunday he is to be loaded with names, not quite as many as the Spanish Embassador who signed the treaty of peace in 1783, but only *four*. As to the child, I saw him asleep so can say nothing of his eye, or his genius peeping through it. He may have the sagacity of a Jewish Rabbi, or the profundity of a Calvin, or the sublimity of a Homer, for aught I know, but time will tell!!!"

At the age of four he was sent to boarding school, and made himself conspicuous on one occasion by scratching a rude sketch of the school "marm" on a chest of drawers with a pin, for which he was punished by being pinned to the Schoolmarm's dress. He rebelled however, against this indignity, and in his efforts to get away took a goodly portion of the dress with him. This was probably the first time his artistic talent received notice if not encouragement. At seven he was sent to the preparatory School at Andover, after which he entered Phillips Academy. At thirteen he wrote a sketch of the life of Demosthenes. His attainments in general scholarship were remarkable, and at the age of fourteen, he was passed qualified to enter College. His father however, thought best to detain him for a year, but at fifteen he entered Yale and graduated in 1810. His natural talent led him to decide upon painting as a profession. While still in college he had painted many portraits of his class mates with reasonably good amateur success; he therefore began a course of art study under Washington Allston (a famous artist at that time) as soon as he was free from college duties. In 1811 he sailed from New York for Europe in the ship Lydia; after a voyage of twenty days he reached Liverpool and wrote at once to his parents. In this letter he says:—

" I only wish you had this letter now, to relieve your minds from anxiety, for while I am writing I can imagine mother

wishing she could hear of my arrival and thinking of thousands of accidents which may have befallen me. *I wish that in an instant I could communicate the information*, but three thousand miles are not passed over in an instant and we must wait for long weeks before we can hear from each other."

Soon after his arrival in London he took up his studies under Benjamin West. Upon his first visit to West's studio he found him at work retouching a portrait of King George III. West said: "The King was sitting to me for this portrait when the box containing the American Declaration of Independence was placed in his hands." Indeed! said Morse, and what appeared to be the emotions of the King! What did he say? All he said, replied West, was "If they can be happier under the Government they have chosen than under mine, I shall be happy." Morse remained with West until 1815 during which time he applied himself diligently to his work and made good progress. He here formed a lasting friendship with the Poet Coleridge, Wm. Wilberforce and Henry Thornton, both Members of Parliment; Zachary Macaulay, (father of the historian,) and others that helped him greatly on his way to fame as an Artist. In 1813 he finished his famous picture of the "Dying Hercules" for which he received a gold medal and honorable mention from the Duke of Norfolk, upon the picture being exhibited in the Royal Exhibition at Somerset House.

In 1815 he returned to America in the ship Ceres, and landed in Boston after a voyage of fifty-eight days, and an absence of more than four years. Soon after his return he invented a pump to which he humorously gave the name of "Morse's Patent Metallic, Double Headed Ocean Drinking, and Deluge Spouting Valve Pump." He obtained patents on this device for Fire Engine purposes, and it was quite extensively and successfully used as such in various New England towns. The New Hampshire *Patriot* of April 14, 1818 has this notice:

"An additional fire Engine has been purchased by the inhabitants of this town. It is a new invention of Mr. Morse the celebrated Artist, and is procured for about half the usual cost, say two hundred dollars. It requires much less manual labor, and throws the water a greater distance, and in larger quantities than the old ones, etc. etc. (I believe these Engines throw about three barrels of water, eight feet in five seconds by the combined efforts of eight men.)"

On Oct. 1st, 1818, Mr. Morse married Miss Lucretia Pickring Walker, daughter of Charles Walker Esq. of Concord, N. H. Three children were born to them, Susan Walker, 1819; Charles Walker, 1821 and James Edward Finley, 1823. Susan married Edward Lind, a wealthy planter of Arroyo, Porto-Rico, West Indies, where she lived for forty years, and after becoming a widow, was lost at sea while en-route to Havana from Porto-Rico in company with the writer in 1886. Chas. Walker, (my father,) married Mannete Antil, daughter of B. B. Lancing Esq., of Utica, N. Y. He was a Civil and Topographical Engineer, and made the original survey of Denver, Colorado and the neighboring country. Was one of the organizers of the band that brought Incapadusa to justice for the Spirit Lake Massacre, and was otherwise indentified with the early settlement of the far west. In later years he resided at Say Brook, Conn. where he died in 1887.

James Edwards is still living a bachelor.

Soon after his marriage in 1818 Morse went to Charleston, S. C., where he met with much success. While here he painted among others the portraits of Dr. Finley, Commodore Perry, President Monroe, Maj. Gen. Pinckney, Col. Drayton and many other notables. In 1820 he founded the South Carolina Academy of

fine Arts. In 1821 he returned to New Haven, Ct., and while still pursuing his profession became interested in the study of electricity and galvanism under Prof, Stillman at the Yale Laboratory. During this year he painted his famous "House of Representatives" in full session, each figure being a portrait. In 1823 he invented a machine for carving marble which was successfully used in carving designs out of solid marble and stone. In Sept. of this year, he set up his studio in New York, on Broadway, immediately opposite Trinity Churchyard. His first portrait painted here was that of Chancellor Kent. During this year both his wife and father died. He was painting the portrait of Lafayette when he received notice of his wife's death. Later in the same year he founded the New York Academy of Design and was elected its President which office he held until his death in 1872. In 1827 he again had an opportunity to study the new science of electricity and magnatism, (in which he took a great interest,) through his friend, James Freeman Dana of Columbia College. This was practically his second step toward the invention of the telegraph. The first at Yale, the second at Columbia. Between 1827 and 1829 he pursued his profession with great success and inaugurated a series of lectures on the Fine Arts, the first of the kind ever attempted in this country. In 1829 he again sailed for Europe. He was absent three years, during which time he made still further improvement in his profession and became famous as an artist. He made many acquaintances among the distingushed men of that day through his former aquaintance, and through Gen. Lafayette who formed an affectionate attachment for him. It was also on this trip that a lasting friendship sprung up between himself and Washington Irving and J. Fenemore Cooper the two American Novelists. In Cooper's novel entitled "The Sea Lion," on page 140 will be found an illusion to Morse in which he speaks of him as "my worthy friend." This it will be remembered, was *before* he ever thought of the telegraph. His title of Professor was received in 1835, at which time he was appointed Professor at the arts in the New York University. In 1832 he sailed from Havre on the 1st of October in the Packet ship Sully (Captain Pill) for New York, and it was on this homeward voyage that he first conceived the idea which afterwards developed into Morse's Magnetic Telegraph. On that voyage he made drawings and notes of what is practically the same instrument that is in daily use to-day. What followed you all know. How he struggled with poverty, disappointment and ridicule. How others tried to steal his ideas and inventions, but how he triumphed in the end and lived to see the day when a message could be flashed around the world in a few seconds, and to reap the reward his genius deserved. His first working model was made out of an old picture frame and is kept in a glass case in the rotunda of the Western Union Telegraph Office in New York together with other relics. In some of his experimental apparatus he had magnets as large as half barrels, and manipulating keys two or three feet long. It should be remembered that at that time there was no insulated wire or supplies of any kind electrical to be bought. He had to make everything himself and insulate his wire by wrapping it with tape, before he could wind his magnets,

In 1855 Prof. Morse took the first Daguerreotype ever taken in this country and established the art in the United States, he having been taught the process and provided with apparatus by the inventor, M. Daguerre when in Paris in 1835. At that time and stage of the art the subject was obliged to sit for from ten

to twenty minutes in the full glare of the sun.

In 1844 the first telegraph line was erected and completed between Baltimore and Washington and on the 24th day of May the first message, "What hath God Wrought" was flashed over the wire.

Prof. Morse died at No. 5 West 22nd Street, New York, April 2nd 1872.

His last words were "The best is yet to come."

DUCK MOVEMENT.

Local and Migratory.

P. B. Peabody, Burlington, Kansas.

Every veteran hunter knows how apparently erratic are many of the movements of most of the tribes of ducks. "Apparently," because there is undoubtedly a law, as yet undiscovered, as valid and, under the proper circumstances, quite as readily observable, as that which governs the Snow Geese, during their fall imigrations, as to their times of eating and drinking, and going to rest,—not to say, "roost."

The writer does not presume to think that he has discovered any law governing the migrations. But he offers a few facts for the comparison of notes, with his fellow-naturalists.

In my observations, four conditions control the migrations, or the distribution, *in* migrotions of most varieties of ducks: temperature, moisture, food supply and persecution.

Some ducks, however, seem to appear and reappear, quite "regardless of the weather." Such ducks might well be classed as "semi-resident." In this region, among these, markedly, are Mallard and Green-winged Teal.

Others come early and stay late, both spring and fall. In this class belong; Bald-pate, Shoveller, Pintailand not so markedly, Red-head.

Still others come late and go early, that is, are quite distinctively migrant. Among these might be numbered; Buffle-head, Ring-necked and Gadwall. The other species occuring in the Neosho Valley; Hooded Merganser, Red-breasted Merganser, Canvas back, Lesser Scaup and Ruddy Duck, are too erratic in their migratory movements to admit of so definite a classification.

One species has not been named above, the Blue-winged Teal, which arrives about the first of April, remains, sparingly, to breed, leaving, as a rule, about, May 25, returning, spending the latter part of the summer here and leaving *in toto*, before, say, Oct. 15. To verify the above from my field notes for 1890, the ducks that are definitely known to migrate along the line of this valley arrived, in the spring of 1890, on the following dates:

Feb. 1, Pintail, Redhead; Feb. 2, Ringnecked; Feb. 10, Green-winged Teal; Feb. 11, Mallard; Feb. 13, Baldpate; Mar. 17, Buffle-head; Mar. 19, Gadwall; Mar. 31, Blue-winged Teal, Lesser Scaup, Canvass-back; April 5, Shoveller and April 19, Ruddy Duck.

Of all these, the dates of departure for the northern breeding grounds are substantially as follows:

Apr. 1, Pintail; Apr, 16, Mallards as a whole; Apr. 22, Green-winged Teal, Pintail; May 15, Canvas-back, Ruddy, Gadwall; June 1, Shoveller, Blue-winged Teal, Lesser Scaup and Baldpate.

All specimens observed after May 15, are stragglers, except the Lesser Scaups and Baldpates, which linger in considerable numbers, until about the first of June.

Of the fall migrations for 1890, I have no definite records of any value. What follows is by way of general observation.

Curiously enough, but one specimen

of the Wood Duck was killed, to my knowledge, in this region, during the spring. That was brought to a local taxidermist on March 1. When I took my heavy gun from its case, in the fall, for the early duck shooting, I went to a grassy slough, near the Neosho River, and but one mile from town, Setting out about sun set, I waited until the grey of evening brought down the straggling birds, like rockets; by singles, twos and threes and dozens. This was about Sept. 20, very few Wood Ducks, and no Baldpates, I am positive nest in this region, Yet, about the date indicated, both these varieties were moderately abundant. Judging by the relative number of birds killed from this date until Oct. 20, or thereabouts, Baldpates were to Wood Ducks as three to one. Both varieties arrived at their night feeding-places entirely to late in the day to be identified otherwise than by shooting them.

About the date last mentioned, Oct. 20, the Mallards began to arrive in numbers, to feed on the growing wheat and on the ripened corn. They continued abundant until the first ice, Nov. 25, when they departed, *en masse*, but one specimen having been definitely reported since. The first ice brought the Lesser Scaups, Buffle-heads, Mergansers, and Ring-necks.

Blue-winged Teal had been quite plenty from Aug. 20 until the middle of October. Red-heads and Pintails had arrived about Oct. 10, in quite large numbers, and stragglers remained until the ice came. Of Gadwalls, I do not recall seeing a single bird, since they left in the spring.

Some of us would dearly love to learn what motives or causes govern the great *waves* of migration. But one cause is known to my-self; extreme change in temperature.

I well remember a most remarkable change in the atmosphere, that took place one autumn, several years ago, in a single night. The autumn had been balmy; it had grown late, past mid-November, I believe. We retired at night amid soft air, and under a clear sky, and wakened to find the ground hard frozen, the sky overcast, and a few hard flakes of snow, scudding fitfully southward, in the teeth of a stern north wind and "by wave of their example," southward were speeding the Mallards, also, whole battallions of them, and armies of battallions, quarter-mile high; and every duck of them making a bee-line for the gulf. Such a sight I never saw before, nor shall soon. This was in Minnesota. To digress, for a moment, a year or two previous to the time just referred to, the log-drivers, on a small tributary of the St. Croix river, in Wis. having failed, in the spring, to float down all the winter's cut of pine, raised a head of water in November. I happened home, at the time, and started out, one afternoon quite late, for the river, arriving in sight of the river valley, indeed, too late for shooting. But I could scarcely believe what I saw plainly with my eyes, solid masses of flocks of Mallard ducks, working, low down, along the river, moving up-stream. I sampled those ducks next day, in a bayou tributary to the river. That adventure would make a very pretty story. The shooting began before daylight and lasted until ten o'clock; single birds and flocks, flying, low down, in every direction, without the slightest fear, proving that they had not been long near the lairs of men. Nobody shall ever hear me tell how many ducks I bagged that day; the recollection shames me, so did the birds. But this adventure illustrates how powerfully abnormal changes in water conditions can, and do, affect large masses of water fowl.

To return to the thought of wave migration, three such waves came under my notice, during the past season.

On March 17, I arose before dawn to try the ducks. I had hardly closed my door when the rushing sound of many whistling wings drew my attention upward. And what a sight! A broad phalanx of ducks, at least an eighth of a mile in extent, so high that in the dim light I could not identify them, and all moving steadily northward. Verily, this was a wave *in motion*. Somewhat later, Apr. 4, I enjoyed a similar sight:

A good half mile from my house, the southward flowing river contains an east-and-west bend, about a quarter of a mile long. Returning from an up-river trip, about three o'clock in the afternoon, I found this whole section of the river one homogeneous mass of ducks; Mallards, Teals, Redheads, Baldpates, Gadwalls, Mergansers, Shovelers, Pintails, and who knows but a Canvasback or two. They were unusually tame, and evidently resting. This was, assuredly, a wave *at rest*. In case of neither of these two occurences had there been for 48 hours, any notable change in temperature.

Again on the morning of Oct. 10 another wave surprised and nearly overwhelmed me. There had been a sufficient change of temperature to tempt out the cold-wave flag. And early that morning, at a pond where the night before were only Wood Ducks, Baldpates and a few Coots, were considerable numbers of Coots, Red-heads and Mallards. About the same time, and later, after copious rains, many kinds of ducks were seen in this vicinity in unusual abundance, for a few days at a time.

This hastily prepared paper, sandwiched between interminable duties, is intended as suggestive merely. Whatsoever generalizations the writer may have formed from the above recorded observations are not likely to benefit,—or to harm,—any one but himself. Anyhow, we have theories galore, in this upstart-ish world, the value lies in plain, indispensable facts.

A second paper will treat of local movements, among the different species of ducks.

For the Scientist.

Some New England Orchids.

By C. Antoinette Shepherd, New Britain, Conn.

We have in New England forty-seven species of Orchids, and in Connecticut, forty species have been found, although some of them are very rare. First to greet us in earliest spring is *Orchis spectabilis*, L., the gay, showy, or Spring Orchis. In the Middle States it is called "Preacher in the Pulpit." We find the Orchis on wooded hills in May. Like most of the family, the roots are thick and fleshy. The pale green root-leaves form a pretty setting for the purple-pink and white flowers, on a landscape.

Next *Cypripedium acaule*, Ait., comes to greet us. This is the Stemless or Pink Lady's Slipper, but perhaps better known as "Moccasin Flower," or "Venus Slipper;" it is also called "Indian Moccasin," "Old Goose," "Camel's Foot" and "Noah's Ark." This is the best known of all our Orchids, and very gay she looks, sitting beneath the birch or pine trees. The broad, dark green root-leaves contrasting finely with the large pink flower. The color varies from pale rosy-pink, to deep purple-pink and sometimes we are surprised to find a pure white flower. These albinos are very dainty and beautiful.

During the last of May, *C. pubescens*, Willd., unfolds its pale yellow flowers. This is the large Yellow Lady's Slipper, the children call "Whip-poor-Will Shoe." The stems are about two feet high, with broadly oval pubescent leaves, the flowers nodding at the top of the stem.

It is very easily cultivated. We remember a plant of this species, that was taken from its home in the woods and planted in a garden. The plant was moved four times from one garden to another, and in spite of all change, it grew and blossomed over twenty years, and at last, having lived its alloted time, died of old age.

C. parviflorum, SALISB., the smaller Yellow Lady's Slipper, blooms about the same time. In form and habit it is much like *C. pubescens*, but the flowers are smaller, and are fragrant. The inflated tip is bright yellow; the sepals and petals rich brown-purple.

C. spectabile, SWARTZ., the Showy Lady's Slipper, is certainly the most beautiful of the genus. The stems are two feet or more tall; the large ovate leaves are downy; flowers terminal, often two or three on the same stem. The large much inflated lip is white, beautifully veined and shaded with delicate rose-purple; the color deepens with age until the whole lip is richly colored. We have never seen this plant growing in its native habitat. It is quite rare in Connecticut. We read that in Maine, "whole swamps appear to be devoted to it, and it really impedes progress by its heighth and abundance."

Several fine specimens of this favorite orchis introduced into our garden grow well and flower freely.

Arethusa bulbosa, L., is a shy nymph, clad in rich rose-purple, with a dash of white and yellow to add to the brilliancy of her dress. She dwells in sunny swamps. The flowers are quite unlike any of the other members of the family. The largest and finest specimens of *Arethusa* we have seen were gathered at Nantucket, Mass.

Pogonia ophioglossoides, NUTL., a violet-scented, dainty rose-pink orchis, with beautifully bearded and fringed lip, is quite common with *Calopogon pulchellus* R. BR. The flowers of the latter are deep rose-purple; "lip as if hinged at the insertion," very beautifully bearded towards the summit with white, yellow and purple club-shaped hairs. The flowers are terminal, often six or eight on one stem. The stalks are tall and very slender. Many a swamp is gay during the last of June, or early July, with these bright flowers, nodding high above the sedges.

All the *Habenaria's* are interesting. *H. psyocdes*, GRAY., and *H. fimbriata*, R. BR., are two beautifully fringed rose or lilac-purple Orchids, growing in wet meadows or woodland swamps.

H. ciliaris, R. BR., is the beautiful yellow-fringed orchis; bright, rich, all golden. Its delicately fringed flowers crowded together on a tall scape, rising high above its lowly companions in the swamp.

It is indeed a royal flower. This species is rare in southern New England but is abundant in New Jersey and southward.

Scarcely less beautiful is the White-fringed Orchis, *H. blephariglottis*, HOOK. Wandering one day in a swamp at Nantucket, Mass., we suddenly came upon a large bed of this species. We counted them; there were five-hundred plants, each bearing a dense spike of white-fringed flowers. It was one of the most charming sights we have seen.

Goodyera repens, R. BR., is very noticeable on account or its cluster of deep-green, white-reticulated leaves. They are like a bit of fine embroidery. This plant is valuable in the fernery, is very hardy, but seldom flowers. The flowers are small, inconspicuous, greenish-white.

Laparis liliifolia, RICHARD., is also very desirable for cultivation. The two, broad root-leaves, the low scape, covered with curious flowers resembling insects, make this a charming little plant. "Petals green and thread-like, lip large, wedge-ovate, abruptly short-pointed," and of a

rich brown-purple, sometimes almost bronze-color.

Of the many species of *Spiranthes*, *S. cernua*, RICHARD., is the most beautiful. From the curiously twisted flower stalk, comes the name "Ladie's Tresses." The white flowers of this little orchis are very fragrant. It is the last of the family, blooming late in September and on into October. often in company with the fringed gentian.

FOR THE SCIENTIST.

The Trenton Limestones and Hudson River Shales.

BY R. R. ROWLEY, CURRYVILLE, MO.

As the first of this series of articles on the Palæozoic rocks of Pike County began with the Edgewood outcrop, the under strata of the Hudson and Trenton Groups were passed without notice.

In many parts of the county the Trenton Limestone is exposed along the streams and is everywhere a hard bluish colored stone, weathered into countless holes and usually filled to repletion with fossils.

The best exposures are near McCune Station on Peno Creek, along Buffalo Creek and at the lower ford on Calumet Creek.

The fossils are usually casts and the most abundant species are *Assaphus sp?* several species of *Orthoceras*, *Gomphoceras* and *Endoceras*. Some of the *Orthoceratites* are of huge dimensions. *Murchisonia bellicincta*, *M. bicincta*, *M. gracilis*, *Trochonema umbllicata*, *Subulites sp? Raphistoma lenticulare*, *Maclurea sp? Fusispira sp? Streptelasma cornicula*, *Halysiles catenulata? Receptaculites oweni*, *Rhymchonella increbescens*, *Orthis lynx*, *O. perveta*, *O. insculpta? Streptorhynchus filitextus*, *S. sp? Strophomena deltoidea.*

Near Auburn in Lincoln County, the Trenton Limestone contains a great abundance of soft flints charged with small fossils, some of which are in a fine state of preservation and occasionally specimens are found weathered out.

The species embrace a *Ceraurus.*, *Assaphus megistos?* a fine *Cyrtoceras*, *Orthoceras arcuoliratum*, *O. sp? Cyrtolites*, (five species,) *Cyclonem? sp ? Murchisonia bicincta*, *M. gracilis*, *Helicotoma sp ?* several other Gasteropods, *Orthis perveta*, *O. tricenaria*, *O. pectynella*, *Streptorhynchus filitextus*, *Orthis testudinaria*, *Rhynchonella increbescens*. *Zygospira recurvirostris*, *Z. sp ? Camarella ? sp? Petraia sp ? Archæocrinus sp ? Monticulipora discoidea*, *M. lycoperdon*, *M. sp ?* and *Columnaria alveolata?* The last species is found weathered out and lying in the fields in masses from a few to a hundred pounds in weight. Occasional specimens of a huge *Orthoceras* are also found loose.

HUDSON RIVER SHALE.

Overlying the Trenton Limestone at many points in the county are from a few feet to fifty feet of soft blue shales with thin bands of limestone. Many of these outcrops yield no fossils. Along Noix Creek, fragments of *Assaphus megistos* and a large *Lingula* have been found.

Near the mouth of Buffalo Creek, *Orthis Subquadrata*, *O. testudinaria*, *O. acutilirata*, *Rhynchonella capax*, *Streptorhynchus planumbona*, *Murchisania bicincta*, *Monticulipora sp?* (a cylindrical, branching species) and a massive species of the same Coral, have been picked up.

On the head waters of Calumet Creek, an entire specimen of *Assaphus megistos*, about twelve inches in length, was found some years ago and taken from the county.

At the same locality, several species of *Monticulipora* and a *Conularia* were collected.

A gentleman named Scholl, living in the Calumet neighborhood is reported to have an almost perfect specimen of *Assaphus* and the writer has two small,

almost entire examples from the Trenton Limestone.

Five outcrops of Trenton Limestone were reported by Prof. Swallow in the old Missouri Survey, near New London, Ralls Co., on Salt River, but we have never visited the localities.

The Edgewood beds which served as the subject for our first article were referred to the Hudson River Group, doubtfully, but the discovery of additional fossils leads us to doubt our former reference and we now believe the rocks to be the equivalent of the base of the Niagara Group or the Clinton beds.

The Pike County Palæozoic strata embrace the following series of rocks from the lowest to the highest in correct order:—

Trenton Limestone,	exposed on	Peno Cr.
Hudson River Shales	"	Buffalo "
Niagara Limestone,	"	near Cornith [church.
Lithographic L'stone, and underlying Shales	"	at Louisiana.
Shales and Vermicular Sandstone,	"	Louisiana.
Chouteau Limestone	"	near Curryville.
Burlington Group	"	at Louisiana.
Keokuk Limestone	"	on Indian Creek.
Coal Measures	"	" Peno Creek.

FOR THE SCIENTIST.

Some Peculiar Nests and Eggs.

GEO. H. BERRY, CEDAR RAPIDS, IA.

During the past season I have observed some queer nesting sites. During May, 1890, a gentleman and myself were crossing a meadow, when suddenly a Bluebird arose from the grass, almost under our feet. We thought nothing of this, but, as she came back and alighted in the grass from which she had risen, as soon as we had gone a few rods, we concluded to investigate. We found her nest with four typical light blue eggs in an old fruit can which was laying on its side in the grass. The same week I found a set of five eggs of the Brown Thrush four of which are of the usual size, the fifth being perfectly spherical and about the size of the eggs of the House Wren. This egg, upon blowing, contained no yolk. I have the set now. Never heard of a similar case. During June, 1890, at Spirit Lake, Iowa, I found a nest of the Rose-breasted Grossbeak built on a beam, in an open shed, which stood in the woods about a fourth of a mile from the nearest house. The nest was built of sticks, coarse weeds, stems etc., and lined with fibrous roots. The three eggs were a greenish-blue, thickly speckled around large end with light brown.

A curious case of socialism also came under my observation this season. In the forks of a small oak tree was a nest of the King bird containing five eggs and scarcely two feet above this, was a nest of the Orchard Oriole containing four Oriole eggs and two Cowbird eggs. The birds appeared on terms of perfect harmony with each other and once I saw both Kingbirds and the male Oriole unite in driving away a large Hawk which they seemed to consider an unwelcome visitor. A friend of mine found a nest of Indigo Bunting last summer, containing three eggs. One of these was well advanced toward incubation, the other two were merely empty shells of the usual size and color, one of which was drilled before he noticed the emptyness. The other remains as it was when taken. I have examined it carefully with a magnyfying glass but can find no crack or fracture whence the contents could have been extracted. An old man said they were sucked by a snake but I cannot see how a snake or anything else could extract the contents and not fracture the shell.

I wish to correct the article on " Owls of Eastern Ia.," appearing in the Jan. SCIENTIST by stating that my eggs of the Great Horned Owl that appear of a

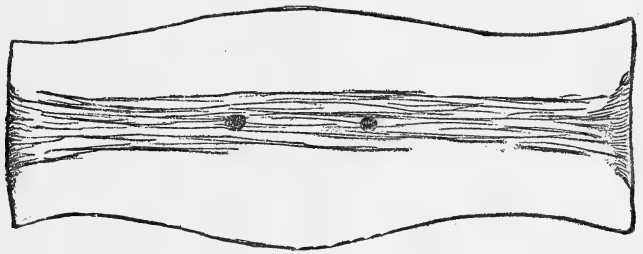
greenish hue are unnatural. I broke one of them to decide what caused the color and found the inside of the shells covered with a thick blue mould. Will some one tell me how to remove this? I also have a set of Mourning Dove eggs that are in the same condition. I have removed all the eggs that are moulded from among the others and am trying to cleanse them, but so far am unsuccessful. I must add the Short-eared Owl to the list appearing in Jan. SCIENTIST, as one was killed near here last week. I saw a flock of Robins Jan. 20th, pretty early for this locality.

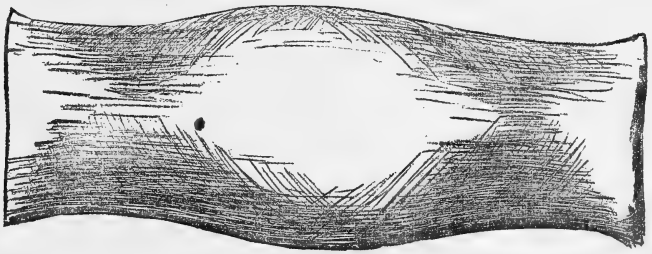
Hand Protectors.

BY PROF. EDWIN WALTERS, KANSAS CITY.

The first implement to which attention is called is denominated in the government and other report as a "twine twister" or "boat shaped article" etc. None of the published works give a satisfactory explanation of the probable use of this article. Mr. T. J. Tidswell of Independence, Mo., who was associated with me for some two years in scientific work, has reached the conclusion that this article was used under the handle or bail of buckets or other vessels, as well as that of bundles, as a protector of the hand of the carrier. In ancient time, as is well known, ropes of rawhide or of fibre were used for handles. The wooden hand protectors or modern bails are generally cyclindrical and have a hole through them longitudinally in which the bail is inserted.

These ancient protectors are semi cylindrical and the bail rested on the flat surface, the rounded side being modified to fit the curves of the inside of the hand. Figures 1 and 2 show the exact size of one of these implements. No. 1 shows the flat surface and No. 2 the rounded surface. These implements almost always show two shallow holes on the flattened surface as shown in figure 1. These holes were probably for the purpose of receiving one end of short pieces of fish bone or other substances—the other end being inserted in the rawhide or other bail material. This arrangement would prevent the bails slipping on the protector.





I have seen Indians use hand protectors

that were made of wood. Sumac is usually selected for this purpose. A cross-section of the proper length is split and two protector made from it. By removing the pith and exaggerating the grove somewhat, a good receptical is made for the bail.

Bacteria in Milk.

Professor H. W. Conn, in discussing the bacteria of milk in the *American Microscopical Journal*, remarks that their function varies with the species, some of them having the property of imparting an agreeable flavor to the butter made from it, while others communicate a disagreeable odor and taste. From milk and cream the author has isolated forty different species, which, from their effect, are divisible into three classes: (1) Some produce no visible effect, the milk remaining apparently unchanged. Some of these, however, render it slightly acid, others slightly alkaline, and nearly all produce certain decomposition odors; (2) Another series has the power of breaking up the milk-sugar, producing sufficient acid to curdle the milk. To this belongs B. acidi Lactici; (3) A third class curdles milk, but the reaction is either alkaline or the reaction is not affected. Such bacteria have the additional function of dissolving the curd which they produce, converting it slowly into peptones, whereby the milk becomes liquid again. The author then proceeds to discuss the connection between butter and bacteria, the connection being established through cream, in which the growth is longer continued and more prolific. How the action of bacteria on cream results in what is known as "ripening" by which butter "comes" more easily; secondly, it keeps longer; thirdly, the flavor is improved.

The ripening is effected by the action of bacteria, which disintegrates the albumen, partly by the action of an acid and partly by peptonization. The flavor is due to the impregnation of the butter with aromatic principles, the product of decomposition, the difference in taste and odor being due to the action of different bacterial ferment. Hence, butter made from sweet cream is flat, insipid, and tasteless, because the bacteria have not had time or opportunity to produce the volatile decomposition products.

The author finally discusses the relation of milk-souring to electricity. From a series of experiments on milk, he finds that electricity has not this effect on milk, and offers in explanation that "thunder-storms" are usually preceded by climatic conditions of temperature and moisture very favorable to bacteria growth.—*Jordan.*

Subscriptions Received.

The following stationers of Kansas City, receive subscriptions for the SCIENTIST and will have the different issues on sale :—T. O. Cramer, 1341 Grand Avenue: B. Glick, 535 Main Street; Osborne and Pitrat, 819 Main Street; H. T. Wright, 720 Main Street.

One of our regular contributers is thus refered to by the Editor of *Trinity Church Bell:*—

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The Scientist.

FORMERLY THE NATURALIST.

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KANSAS CITY, APRIL, 1891.

A Monthly Journal, devoted to all branches of

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The Academy of Science, Pub. Co.,
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R. B. Trouslot, Editor.
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MRS. FRENCH SHELDON has fully decided to visit central Africa with a view of observing the female characters and customs of the natives of "the dark continent".

THE West is ever aggressive and progressive as well. Fortunate California! Her Leland Stanford, Jr., University is to be congratulated, having secured for its president, the learned and distinguished ichthyologist, Dr. David S. Jordan.

THE Planet Mars makes one revolution in its orbit in 687 days, or 43½ days short of two Julien years, hence it will be en opposition with the earth in 1892, and it is expected and hoped that a telescope of sufficient power be finished by that time, to furnish a solution, to the query. Is Mars inhabited? Also to make clear the straight lines, resembling canals. Eminent Astronomers look for great results as Mars exhibits a greater analogy with the earth, than any other planet of the solar system.

WE learn through the *Junction City Tribune* that Nebraska now has an Academy of Science; Dr. T. S. Kingsley, of the State University being president. This, we understand, was attained from forces set in operation by Chaplain John D. Parker, while stationed at Ft. Robinson, Neb. This is the third Academy founded by the Chaplain, and we will not be surprised to hear of his starting another one in Arizona, he now being located at Ft. Bowie, that state.

STATE GEOLOGIST WINSLOW, in a paper read before the Geological Society of America entitled, "The Geotectonic and Physiographic Geology of Western Arkansas," advances a new theory on the much discussed subject of Prairies and their Treelessness. Speaking of the Prairies of Western Arkansas, Prof. Winslow says: "Praries are generally subordinate valley features. The ab-

sence or scarcity of trees is the essential distinguishing characteristic. The maintenance of these prairies, and probably also their origin, may be explained as due to a combination of causes ; namely, the alternation from an extremely cold, wet soil during the rainy season, to a dry, hard soil in the dry season, and further the periodic recurrence of prairie fires which shrivel such young tree growths as overcome the obstacles inherent in the soils."

A NILES, Mich., correspondent writes to the Chicago *Tribune* as follows on the duration of the lightning flash. "Notwithstanding all the authorities teach, without exception, as far as I know, that the flash is instantaneous, it can easily be shown without resorting to the camera or any other apparatus that it is not so. In case of a thunderstorm step into a dark room or corner where nothing can be seen except as it lightens and slowly move the hand in a circle of six or eight inches. At each flash the hand will plainly be seen in motion. If it were instantaneous the hand would appear stationary. We are told that a horse trotting or a wheel in motion appears as standing still when observed by the lightning flash. I have tried the experiment of turning an electric machine during a thunderstorm. When a spark passes, the disc always appears stationary, while by the flash of lightning it is always seen to be in motion." The correspondents experiments and conclusions are based upon the sense of sight. To test the fallacy of his conclusion simply look at a wheel revolving so fast that the spokes cannot be seen. Shut the eyes; the instant they are opened all the spokes in the wheel are visible, and for an instant appear to be stationary.

THE Academy of Science now has permanent quarters at room 200 Baird Building at the Southwest corner of Sixth and Wyandotte Streets. The meetings are held every alternate Tuesday evening, beginning promptly at eight o'clock. All are cordially invited to attend. Interesting programmes are always provided. The dates for the next few months are as follows :—Tuesday eve. April 7th and 21st, May 5th and 19th and June 2nd, 16th and 30th.

OUR exchanges are at liberty to make extracts from our columns or publish articles in full. In each case, however, we expect proper credit. A majority of the articles published in the SCIENTIST are written especially for us, and a publisher who uses them without proper credit is guilty of piracy. The paper referred to in this instance, hails from Denver, and if the offence is repeated, we will not hesitate to publish names.

WE are indebted to Prof. F. M. Webster, for Bulletins No. 25 and 33 of Purdue University Agricultural Experiment Station of Indiana and for a pamphlet "Insecticides and their Application."

THE first article in this month's SCIENTIST, cannot help but be of general interest, coming as it does from the grandson of the late Professor Morse. While very brief it never-the-less contains several facts never before published.

MSS. Received.

The Great Blue Heron, By Dr. W. S. Strode, Bernadotte. Ills.

Clouds-Burst in Arizona, By John D. Parker, M. S. A., Fort Bowie, Arizona.

Ethnology, Ancient Implements. Illustrated, Professor Edwin Walters.

Drawing for Photo Reproduction, illustrated. By Roger Cunningham.

Interesting articles are also in preparation, by Hon. Warren Watson and Mr. D. C. Jordan, besides several papers which have recently been read before the Academy of Science.

Birds of Kansas.

We have just seen a copy of "Birds of Kansas" by the late Col. N. S. Goss. The book treats of 343 species and sub species, and is illustrated by photogravure engravings, made from mounted birds in the "Goss Ornithological Collection."

The general descriptions are quoted principally from "Baird, Brewer and Ridgway," the classification being adapted to conform with modern ideas. The original notes that follow are especially interesting and entertaining.

Woodpeckers are considered great destroyers of forests and cultivated trees generally. The fallcy of this common idea is apparent in his pleasing description of the Downy Woodpecker which comes in for a goodly share of popular prejudice. He says: "Of all our woodpeckers none rid the apple trees of so many vermin as this, digging off the moss which the negligence of the proprietor has suffered to accumulate, and probing every crevice. In fact the orchard is his favorite resort in all seasons, and his industry is unequalled and almost incessant, which is more than can be said of any other species we have. In the fall he is particularly fond of boring the apple trees for insects, digging a circular hole through the bark just sufficient to admit his bill; after that a second, third, etc., in pretty regular horizontal circles around the body of the tree. These parallel circles of holes are often not more than an inch or an inch and a half apart, and sometimes so close together that I have covered eight or ten of them at once with a dollar. From nearly the surface of the ground up to the first fork, and sometimes far beyond it, the whole bark of many apple trees is perforated in this maner, so as to appear as if made by successive discharges of buckshot, and our little woodpecker, the subject of the present account, is the principal perpetrator of this supposed mischief—I say supposed for so far from these perforations of the bark being ruinous, they are not only harmless, but, I have good reason to believe, really beneficial to the health and fertility of the tree. I leave it to the philosophical botanists to account for this, but the fact I am confident of. In more than fifty orchards which I myself have carefully examined, those trees which were marked by the woodpecker (for some trees they never touched, perhaps because not penetrated by insects) were uniformly the most thriving, and seemingly the most productive. Many of these were upwards of sixty years old, their trunks completely covered with holes, while their branches were broad, luxuriant and loaded with fruit. Of decayed trees, more than three-fourth were untouched by the woodpecker. Several intelligent farmers with whom I have conversed candidly acknowledged the truth of these observations, and with justice look upon these birds as beneficial; but the most common opinion is that they bore the trees to suck the sap, and so destroy its vegitation, though pine and other resinous trees, on the juice of which it is not pretended that they feed, are often found equally perforated. Were the sap of the tree their object, the saccharine juice of the birch, the sugar maple and several others would be much more inviting, because more sweet and nourishing than that of either pear or apple tree; but I have not observed one mark on the former for ten thousand that may be seen on the latter; besides, the early part of the spring is the season when the sap flows most abundantly, whereas it is only during the months of September, October and November that woodpeckers are seen so indefatigably engaged in orchards, probing every crack and crevice, boaring through the bark, and, what is worth remarking, chiefly on the south

and southwest sides of trees, for the eggs and larvæ deposited there by the countless swarms of summer insects. These, if suffered to remain, would prey upon the very vitals (if I may so express it) of the trees, and in the succeeding summer, give birth to myriads more of their race, equally destructive."

Correspondence.

BERNADETTA, ILL., March 22nd, 1897.
Editor SCIENTIST:—

Today the first great bird wave of the season passed up Spoon River valley.

The birds noted were mainly Red-winged Black-birds, Grackles, Robins, Brants and Ducks.

Of the Blackbirds there was simply thousands. At a given point I watched them passing for thirty minutes, not in a continuous stream, but in separate flocks of from twenty to a hundred or so. Some of the flocks would be nearly all Redwings, others would be largely made up of the Purple Grackle, or Bronzed Grackle as I believe the A. O. U. Committee have determined our western species to be.

Sometimes Grackles, Redwings and Robins would be all mixed up, but all going in the same general direction.

The fields and fences were also full of Meadow Larks and Bluebirds that arrived during the night.

Hundreds of Brant Geese were winging their way to the lakes of the north.

Many ducks too, were to be seen, and notwithstanding the fact that it was Sunday, many farmers along the river were out with their shotguns, and the continual boom-bang as I rode down the river for six miles, reminded me very forcibly of war times, and firing along the picket lines.

DR. W. S. STRODE.

207 Disappointed !

An Indiana girl has taken the prize of $200 offered by the *Cosmopolitan* Magazine for "best article of 4000 words descriptive of farm life, with suggestions as to the best method of making farm life attractive and happy," only farmers' daughters being permitted to enter the competition. The design of the *Cosmopolitan* was to draw out an expression of opinion as to the important problems of happiness and discomfort on the modern farm, and it was so successful that 208 manuscripts, very many of them ably presenting nearly every State and Territory, were sent in. The prize was awarded to Miss Jennie E. Hooker of McCutchanville, near Evansville, Ind. Her article appears in April *Cosmopolitan*. Taking the prise over so many competitors, doubtless Miss Hooker's article will present numerous ideas well worth the consideration of those who find their happiness or discomfort within the limits of farm homes.—(Price 25 cents, Cosmopolitan Publishing Company, Madison Square, New York.

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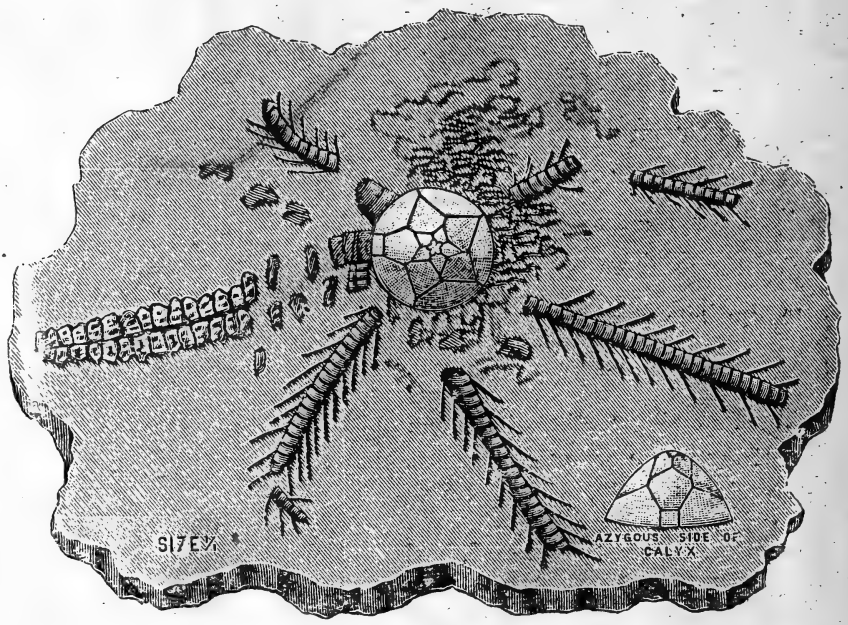
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THE KANSAS CITY

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ASTRONOMY. GEOLOGY. PHILOSOPHY. MINERALOGY. BOTANY. METEOROLOGY. ARCHÆOLOGY. ZOOLOGY. MECHANICS.

Official Organ of the Kansas City Academy of Science.

VOL. V. KANSAS CITY, MO., MAY, 1891. NO. 5

FORMERLY

THE NATURALIST.

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KANSAS CITY, MO.,
ACADEMY OF SCIENCE PUB. CO.,
Publishers.

SUBSCRIPTION BLANK

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The Scientist.

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Published Monthly at $1.00 per year; Foreign countries $1.10; Single Nos. 10c.

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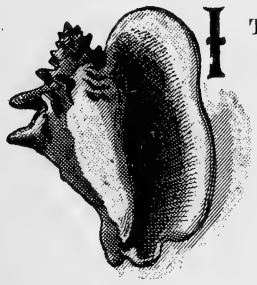
VOL. V. KANSAS CITY, MO., MAY, 1891. NO. 5

Read before the Kansas City Academy of Science.

Drawing for Photo-Reproduction.

By Roger Cunningham.

Mr. President and Gentlemen:—



IT frequently happens to the student of nature and her phenomena that he wishes to present along with the written record of his observations, such pictorial illustrations as will make his meaning clear, or will convey to others an accurate understanding of the forms, markings and structure of the things observed. In a majority of cases, it is safe to say, that a careful drawing even on a small scale, will convey more real meaning and instruction to the party instructed than pages of technically correct description. Especially is this the case when you address your description to the untechnical public in a journal of popularized science. And this want makes itself felt in every conceivable branch of scientific research. The engineer has to use diagrams, so, too, the optician, the astronomer, the architect, and the surgeon, while the geologist, ethnologist, archæologist, zoologist, each in turn requires pictures without number, to make his long story short.

Up to a comparatively recent date there was only one way to secure pictorial illustration of such work, and that was by making drawings, or by having them made on wood, to be rendered into woodcuts by professional engravers. How unsatisfactory this was and how inadequate to the varied needs of the scientific worker, can be easily shown by a cursory glance over the pages of any scientific publication of ten or more years ago and even later,—turning afterward, for contrast, to the richly illustrated papers of any of the technical journals of to-day. Wood engraving, while absolutely unsurpassable, up to date, for the purpose of artistic illustration, is too slow and too expensive for the purpose of technical illustration and the engraver is too remote from the author.

The scientific reporter on nature's dai-

ly journal needs to be unhampered; he knows best what feature he needs to make prominent, and he would fain be his own engraver. This he can be, thanks to the rapid extension and wide introduction of photo-chemical engraving methods. Now, the man who makes the drawing is the real engraver, the platemaker merely conferring on him the means for a rapid manifolding and correspondingly easy and wide distribution of his drawing, and this at a price only a tithe of what he formerly paid for a picture, perhaps artistically pretty, but usually more or less incorrect as a delineation of things observed. But as all reproductive methods have their limitations and as not all drawings are capable of perfect reproduction, it is necessary to inquire what methods of delineation will produce pictures capable of facile reproduction in fac-simile. This query it is my purpose to answer. Of the reproductive processes themselves, it is only necessary to say that the one in most general use now, all over the world, is the method of producing an ink photograph on zinc, or copper, afterwards by etching with acids transformed to a relief plate in lines or dots, and which is properly to be termed photo-chemigraphy, but is practiced under many different names.

Pen Drawing.

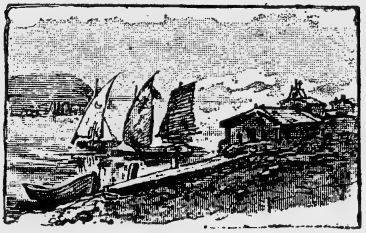
The method of making drawings, which is best suited to the processes of the photo engraver is also one of the oldest, and by reason of the simplicity of its manipulation, the easiest of all drawing methods—pen and ink. Now the photo engraver requires that drawings for his use shall be so made that it will be easy for him to make therefrom a negative of the greatest density, the lines or dots of the drawing represented by perfectly clear glass, the white paper by an intensely opaque and black film. To assist him in this, the draftsman must give him a drawing, all the lines of which must be intensely black, without being glossy, and the surface drawn upon should be pure white, or bluish white. In cases of absolute necessity a process negative *can* be made from a drawing on grayish, brownish or yellowish surfaces, but the quality of the engraved work m aysuffer, and such work is only taken at customer's risk. The best surface to draw upon is pure white wedding bristol card, 3-ply or thicker. A great deal of the work of the professional draughtsmen is done upon a heavily enameled white card, called "scratch board," "Ben Day enameled card," or "double-enameled porcelain." The coating of white enamel is so thick that it is easy to cut white lines similar to the white cross lining of wood cuts, using a knife point or special scraping needle for that purpose. This paper can only be had of good quality from photo-engraving houses,—it requires some practice for the draughtsman to become used to its peculiarities, but yields fine results when these are overcome. Very dark parts of the work are painted in, in solid black, with a brush, so as not to disturb the enamel, and then stippled or lined up with the needle, as with a graver on woodcuts. The same object is attained when drawing on the bristol board, by laying in the dark parts solid black, (always with a brush,) and after the ink is thoroughly dry, mixing up some pure flake white water, so it will run freely from the pen, then producing the graduation by drawing on white lines. Never go over the lines a second time nor cross them until the first lining is perfectly dry. If the white line on the black looks bluish, the white is not mixed thick enough, and more should be ground up so that the resulting line may dry a solid white. The black pigment used should be real Chinese or Japanese ink of the best quality. It is not necessary to use inks of English or any other indirect importations at fancy prices. A large stick of real Japanese only costs $1.00. A large stick of

real Chinese ink can be had of a Chinese curio merchant for 25 to 35 cts. It will last one man for a year at steady work, and is better adapted to our work than a stick of Windsor and Newton ink costing $3.00. The best way to prepare it is by rubbing up in an ink well-slab of the usual form, until quite thick or syrupy. This may be ascertained by tilting the saucer slightly and observing carefully the sediment that remains after replacing it. If enough of the fluid remains upon the side to entirely obscure the color of the vessel, even when blown upon with some force, it is sufficiently thick for use; but care should be taken to avoid getting it so thick that it will clog the pen or refuse to run freely from the nib. A brilliant engraving, with sharp, regular lines, cannot be expected from pale ink or rough paper. Pale black or yellow-brown or bluish lines will inevitably come out weak or broken and ragged in the engraved plate. All lines, therefore, should be perfectly black—but not necessarily coarse or heavy. Lines may be very fine, but they must be black. In producing shades of color it is not always necessary to strengthen the lines. Beautiful gradations are sometimes produced by widening or narrowing the spaces between very fine lines.

Water color lamp black, rubbed up with a small addition of burnt sienna, makes an excellent ink for the photo-engraver. Those who wish to use a ready prepared liquid India ink will find the American makes, Higgins' and Turck's better than any thing imported.

Pens.

Steel pens are always best, making smoother, finer and more even lines than any others. From long experience most trade draughtsmen greatly prefer Gillott's, Nos. 303, 170 & 290. A pen is worn out at the end of one or two day's work and should be thrown away. If coarse lines are desired, use a coarse pen but not a worn one. The sable brush, in hands accustomed to it, is almost the best of all outlining tools. I have seen fine pen drawings, (excuse the bull) done throughout with a red sable brush and ink. If drawing for newspaper or similar printing, do not shade much. These and ordinary book illustrations can be made twice the size of intended cut each way. The book illustration can receive fuller shading. Fine work for good printing should be two and one-half or three times the size of intended cut in each dimension. It is well to form the habit of shading with from twenty-five to forty lines to the inch. Then if a finer cut is desired increase the scale of drawing.



All preliminary sketching should be with a pale blue pencil, as blue is photographically inactive and photographs white. If this is delicately done the drawing can then be inked in on top of the sketch itself without retracing. If the subject is complicated, or it is desired to trace (calk) from a photograph, prepare a sheet of transfer paper by rubbing a sheet of ordinary tracing paper, or strong white tissue, thoroughly with finely powdered dry cobalt or prussian blue, using a rag, and at last rubbing off all loose powder. Lay this under a rough sketch or the photo, blue side next to the card board and calk down, using just enough pressure to produce fine lines. A common crochet or darning needle, slightly blunted, makes a good tracer. Always leave a wide margin, one to two inches, all round the drawings.

Salted Prints.

Many draughtsmen when making draw-

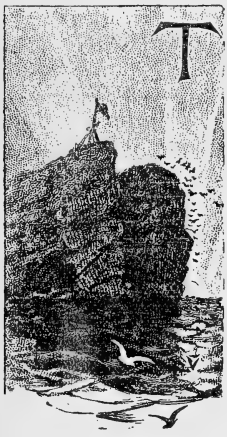
ings of mechanical or natural objects, in order to secure greater accuracy of detail, make use of photographs on plain paper, that is, paper not albumenized, the picture appearing as if drawn in reddish brown washes on a matt surface. They are called salted prints from the fact that the paper, before silvering, is dipped in a bath containing an infinitesimal proportion of gelatine and a small percentage of ammonium chloride. In practice it is better to buy Clemon's plain salted paper from any photo supply house and silver it as required, than to mess around salting it for one's-self.

The silver solution for plain paper is made up of pure distilled water or filtered rain-water, 9 ounces; nitrate of silver 1 ounce. Dissolve the silver in the water and separate three ounces of the solution from the rest, say in a graduate. To this three ounces add liquor ammonia, drop by drop, until the oxide of silver precipitation first produced is re-dissolved and the solution becomes clear; then add to it the remaining six ounces of solution. Oxide of silver will again be formed, but can be allowed to settle to the bottom and remain there until the solution is all used. The solution is applied to the paper with a small swab of clean cotton, or wool, or a pad of canton flannel. It is well to filter a little of the solution for use each time, thus avoiding soiling the paper with the scum which collects upon the surface of the liquid. Care should be taken to apply the solution evenly and lightly, otherwise the surface of the paper may be roughened. After silvering, the paper is hung up in a perfectly dark room till dry, which drying may be assisted by artificial heat. When handling the paper, great care is necessary not to finger-mark or soil it, each careless touch coming up on the work when printed and fixed. Print under an ordinary negative until all details are up satisfactorily and only slightly deeper than required in the finished print, for it will not lose much in fixation. It does not require toning. When printed, I usually immerse in a bath of salt water for five minutes, then rinse and fix in fresh hypo-sulphate of soda solution, strength one ounce to seven, for ten to fifteen minutes, then put in a tray and wash under running water ten to fifteen minutes, or by completely changing the water six or seven times, letting it stand five minutes each time. To eliminate last traces of hypo, flow with a bath containing one or two drams of a solution of acetate of lead, strength 1:8, in each pint. Let rest in this for ten minutes, rinse two or three times, and hang up to dry, or dry between clean blotters. When dry, brush the backs over with fresh starch paste, and paste down on smooth heavy white card. Lay between clean dry blotters under weights to dry. The drawing can then be outline dcarefully and solid blacks painted in, even a considerable amount of shading done. When the artist feels that he has carried the work as far as needful on the print, he lets it get quite dry, often by stove heat, and flows it with a solution of water 8 oz., alcohol 8 oz., corrosive sublimate 1 oz. This solution will keep indefinitely and can be returned to the bottle and used over and over

The print will bleach out, to nearly white paper, and when dry the drawing can be finished up as desired. It is necessary to keep the drawing thus made, in the dark, if much time is to elapse before it is engraved, as a slight browning may occur in a strong light. A moderate amount of exposure to half-light indoors will not affect it. The ink used should be of the best quality and freshly rubbed up, and must be bone dry when the bleaching solution is poured on. The alcohol diminishes the action of the water on the ink, the paste and mounts. The drawing will cockle some when flowed but will dry out smooth and straight.

Drawings in Pencil.

These can be made on a paper with a good, sharp, even tooth, or grain, like Steinbach paper or even the finer grained English drawing papers and if carefully reproduced without much reduction can be printed so as to give fine results. Generally speaking, however, this exacts too much from the etcher and printer, especially when the latter has to work with cheap ink and paper, and other drawing materials can be so used as to give better results with no greater pains.



THE fact that an American manufacturer is now supplying an excellent quality of printed ruled tint sheets and embossed chalk surface paper greatly facilitates the work of the illustrator, especially if he be an amateur and averse to the severer labor of the pen work. These papers are coated with a preparation easily cut away with a scraper and are embossed in various regular patterns of lines, dots, etc. White line effects are easily produced by scraping on parts first brushed in, in solid black, or on the ground of tint itself and if the scraping goes a little farther we get pure whites, as desired. In Germany, these papers are used for the production of high grade artistic illustration, side by side with wood engraving. As a rule, American draughtsmen have neglected them. The best way to work on these surfaces is to sketch the subject lightly and with fine clear blue pencil outlines, then with the brush, put in the solid blacks and those parts meant for dark gray. Let it dry completely and restore the light in these last by scraping with the edge of a sharp eraser, then put in the half-tones all over, with black wax crayon, (No. 2 lithographic crayon,) or with "Dixon's Best Black" crayon. Do not use much pressure but keep the point quite long and sharp and to gain depth of tone work rapidly from various directions in short circling strokes so as to cover the sides of the grain. In the lights, work delicately on top of the grain. Do not try to recover light tints in parts that are too dark, by scraping; it makes it muddy. When all is worked up as far as can be in crayon, finish by putting in bits of clear outline and snappy little blacks with pen, and cleanly scrape out any desired whites, with the eraser. Such a drawing will always reproduce and print well. You have seen some evidence of that in Mr. Hare's drawings in the Scientist.

Surface papers can be used in combination with pure pen work or with each other. Suppose you wish to draw a grey fossil on a dark matrix of rock. Cut from one of these papers, (say "Hand stipple," No. 1½,) a piece the exact shape of the outline of the fossil. With strong starch paste, put it down firmly on a piece of enamelled card. Outline the rock surface and paint it in all black; when dry, line this up in a simple manner with a needle point. With pen and crayon work up the details in full on the fossil, keeping the work light. Or try drawing in a dark bird, with full heavy shades on a piece of the grey paper, (No. 10 or 12,) when done, a very few strokes in white will detail the bird, and a few sketchy pen outlines, kept quite simple, will convert the gray background into a delicate pleasing landscape. Other uses will readily suggest themselves.

Autotype.

In the near future the so-called "half-tone" process of plate making, for which no operator has as yet found a correct name, will largely crowd others out. My reason for speaking thus in regard to

the name is; first, that several other processes, as gelatine printing, woodburytype, photogravures and all ordinary photography, produce half-tone pictures, going by gradation from light to dark, as distinguished from engraved or drawn pictures in lines or dots, while in this process some shades of the half-tone are always lost and the work is flatter than the original. Foreign engravers come closer to it with the word phototypie.

This work can be readily made from good photographs, plucky negatives containing plenty of sparkle, and good detail in both lights and shadows. When these qualities are lacking the print must be retouched in the shadows with flake white, its whiteness just broken a trifle with some warm pigment, till it matches the light parts of the photo. In the lights, where detail is lost, it must be restored with the brush and india ink, also warmed up with color to match the middle tones of the photo. The best reproduction of all will result when, instead of a photograph, you send to the engraver a clean, strong drawing in washes of india ink, made on rather smooth water color paper, just tooth enough to take washes well; all the details well brought out, textures attended too and unimportant parts and the background kept flat. A plate from such a drawing will always please, provided the ink, paper and printer are of the best. Otherwise it is better to select some other process. This about completes the list of illustrative methods which may be called practical and popular and at the same time yielding the best results. Of some others, more restricted in application, but interesting scientifically, I may perhaps show specimens at some future day. It will be a pleasure to me to answer any questions on these subjects, so far as I may be able to do so, believing that thereby the better recording of scientific facts may be promoted.

FOR THE SCIENTIST.

Movements of Animals.

BY D. C. JORDAN.

An Irishman said that "A hunter's best horse is a mule," and this article may call a bird an animal, for all the writer knows, before it is ended. Classification, arrangement and the necessity of naming things began, of course, with Adam. Until he fooled with the articulate ends of knowledge, and became entangled in the endlessly varrying lines of Life, he did not even know his own name, but for all we know, he might have learned the greater lessons of Creation out of the unsyllabled language of God's unwritten forms. The adage which says, "A rose by any other name would smell as sweet," is as true as that, a bird by any other name would fly as well. What I would suggest is this: When we are thinking of motion or the activity of life, it is quite as well at times not to be tied to names, and the book-classifications, if we will have a look into the wider arena of knowledge that comes by seeing right on through the truth-rifts or the Infinite which show so brightly on our clouded sky. Perfect motion is as suggestive of beauty, and grace, as perfect repose; and the conditions necessary to the production of perfect movements, are the same throughout the whole Universe. These conditions must consist in the absolute freedom of the subject, and the entire absence of all malformations, deformaties, the presence of inharmonious or disturbing elements and of all accidents. All motion under these conditions is perfect, from the almost indefinable movements of diatoms to the graceful curves of waltz or minuet. Above it is stated that perfect motion is suggestive of beauty, to as large a measure as repose. Perhaps this is mostly wrong. Perhaps there is no repose. A muscle

at rest or apparently inactive is, after all, held in the powerful grasp of the Universe and is *active* in its fulfillment of the law of rest.

Life-motion in all stages of development is the result of curiously inter-dependent forces from without. The Diatom as a miniature "*Animal*" (?) has positive movements which depend upon few known conditions. One is, it moves when in contact with some larger body than itself, as if dependent upon the magnetic, chemical, or other influences or forms inherent in its larger neighbor. Possibly its movements are due to a set of invisible cilia, delicately operated by some indefinable power, but then only in such instances when alone and at will in the field for action. Perhaps the cause of motion on the part of these small creatures is hardly definable. And may it not be far from plain *why* motion exists in any of the forms of Life? The fact that these creatures multiply by subdivision, conjugation and spore-formation, is suggestive of an activity which lies so deeply within the recesses of the Infinite that our dull intellects may but faintly guess the cause of it all.

To change abruptly to another phase of the subject: Birds, in flight, afford infinitely varying lines of motion. How birds fly, and why they fly, are as yet not very clearly understood. I have just time to instance an experiment. I am almost tempted to invent a lie to avoid telling the cruel truth in this experiment.

I captured a full-grown "Yellow Hammer" and amputated his legs just below the knee joints. I then tossed him into the air and watched his vigorous and easy flight with some surprise. Presently he came to the ground. Upon my approach he attempted to rise. This was impossible, as the one thing needed was the spring necessary to carry the body past the lowest pitch of the wings, or at least past that line requisite to a second lifting-stroke. This could not be accomplished without the legs. Here it is again. Life-motion depends upon force from without, and the presence of perfect conditions, and the absence of all physical ills and moral infirmities; there is a wide sense in which the soul will swing into the infinitely perfect rythm of the Universe and will catch the lofty cadences of the stars, and sink to rest in the ceaseless motion of God's unending Kingdom.

FOR THE SCIENTIST.

Fossil Collecting in the Burlington Limestone.

BY R. R. ROWLEY, CURRYVILLE, MO.

Of the different series of rocks referred to the Sub-carboniferous strata of the Mississippi Valley, the Burlington Limestone is, perhaps, the most interesting to the intelligent collector, not that its fossil treasures are more perfectly preserved or more abundant in individuals than the Keokuk or Chester divisions, but from the diversity of its Crinoidal remains and the great number of species of Echinoderms. The collector is always happening on something new, and his artistic eye is in constant rapture over the beautiful and ever changing sculpture of the calyx plates of the Actinocrinoids and the granular ornamentation of the Blastoids.

With the exception of a few species of Echinoderms, the number of individuals are few, and when one picks up a duplicate he feels that it is an accident, never knowing when he starts for the quarry just what he will find, unless he has unerringly located the Melo, Norwoodi or some other well marked horizon.

For ten years, the writer has searched for a perfect specimen of a *Tricoelocrinus*, an imperfect example of which he found years ago, but up to date the search has been fruitless. It may turn up unexpectedly some day, an agreeable surprise.

Even the extremes in any one species differ to such an extent that, without the intermediate forms, they might be easily mistaken for two, and, doubtless, many of the now accepted species will, in the future, prove to be synonyms.

While the Burlington Limestone is crowded with remains of Crinoids, at most exposures it is so hard and so stoutly resists disintegration that the collector finds little to encourage his search. A perpendicular rift in the strata, down which the water of ages has been dripping and wearing away the hard surface often yields a few good things and the softer spots in some of the layers, under the action of frost and water, offer up their gems. In one of the quarries at Louisiana, Mo., I have kept close watch on a soft weathered place in a yellow layer, for about fifteen years, obtaining a few nice Crinoids and Blastoids at every visit. Fortunately this spot is in the *Codonites stelliformis* horizon and among the finds are a few specimens of this peculiar Blastoid.

Another favorite spot is a weathered outcrop at the very base of the Burlington beds, in a little run or ravine on a hillside. In twenty years I have dug out of this ledge a number of good fossils. Last Christmas, the weather being fine, I traced this stratum to another little run, and, with the aid of a pick and shovel, obtained four or five Crinoids, scattering the clay and broken rock along the hillside to await the action of the spring rains. A few days ago I visited the place again and picked up loose, in the scattered clay, several nice things, increasing the find to twenty five by a few hours labor with the pick. This particular horizon or stratum is unusually interesting as most of its Crinoids are new and undescribed species, and the fauna is mixed Chouteau and Burlington, the following fossils being readily identified; *Athyris missouriensis*, *Spirifera marionenses*, *Syringothyris hannibalensis*, *Orthis swallovi*, *Streptorhynchus crenistriatum*, *Spirifera grimesi*, *Chonetes illinvisensis*, *Productus flemingi* *Zaphrentis calceola*, *Cryptoblastus melo*, *Batocrinus langirostris*, *B. calvini*, *Dorycrinus unicornis*, *Poteriocrinus meekanus* and *Platycrinus planus*.

Of the unidentified forms there are three or four of *Platycrinus*, three of *Batocrinus*, three or four of *Actinocrinus*, two or three of *Zeacrinus*, two or three of *Agaricocrinus*, one *Dorycrinus*, one *Fenistella*, two or three species of *Zaphrentis*, one *Michelina*, a *Platyceras* and an *Ichthyocrinus*.

FOR THE SCIENTIST.

The Great Blue Heron.

BY DR. W. S. STRODE, BERNADOTTE, ILL.

Whether standing in statuesque pose in the shallow waters of some swampy lake which reflects its tall form, apparently less animate than the clouds or lilly buds those waters mirror, or slowly winging its way down some river's course, the Great Blue Heron is always a striking and picturesque figure in the landscape. It has a wide distribution, ranging from South and Central America, along both seacoasts, to Labrador, Hudson's Bay, Sitka, Alaska, and through the interior.

About seventy-five species of Herons are known, with a distribution world-wide. The torrid and temperate zones claim the greater number.

Their greatest enemy is man, and owing to the destructive methods of the plume hunters, these birds, the *Ardea herodias* are rapidly diminishing in numbers. In the tamarack and cypress lagoons and bayous of the southern states, where the great heronies are situated, they have been almost exterminated, nor have they fared much better in some of their more northern haunts, where they are destroyed many times, not from any mer-

cenary motives, but from mere wantoness.* Yet, notwithstanding this and the fact that every sportsman shoots them when an oppertunity offers, the bird is so keen of vision, and so sly, that many survive to propagate their species an enliven and animate the dark recesses and swamps which they frequent.

There is a popular belief that when the Great Blue flies up stream; look out for rain, or, if it flies down stream, dry weather is indicated. These omens may not be absolutely true, yet, in the abstract, like many popular beliefs and signs, have a foundation in fact. I have many times, myself, noticed, that when a storm was brewing the "Blue Crane" would leave the vicinity of the streams and fly, not up or down the water course, but across the country.

Many "old timers" believed that the herons possessed but one short intestine, which extended straight through the body, and there is now residing in the village of B—. an old gentleman, who served in the Mexican war, that stoutly declares that he has seen the "Blue Crane" repeatedly catch and swallow an eel, it passing through the body as often as swallowed; but when it is known that this pseudo-ornithologist also believes that the Swallows and Swifts hibernate in the mud, at the bottom of the rivers during the winter season, and that the Juncos turn into Sparrows in the summer, and back to Juncos when winter approaches, no one will doubt but that he has seen such things.

Six miles below Bernadotte, on Spoon River, there is now the remnent of a once grand forest of trees. The river making a great bend encloses it on three sides, while the fourth side, on the south, overlooks it with high bluffs. Near the heart of this forest, towering far above all the other trees, are a half dozen giant Sycamores, relics of a primeval forest, survivors of time and storm, their majestic heads reared almost to the clouds, and sturdy white arms flung to sun and breeze. Here for so long a time as the memory of the oldest inhabitant the Great Blue Herons have built their nests and reared their young. For many years they were not molested. The farmers and hunters of the vicinity seemed to feel a pride in "Crane Town," as they called it, and pointed it out to visitors as one of the curiosities of the neighborhood. And so, year after year, fifteen or twenty pairs of these great birds returned to the Sycamores to breed.

But a change was to come over the scene. Lewistown, the county seat, was but five miles away. With advancing years it evoluted from a mere village to the size and pretensions of a city. Legitimate game became scarce, and the problem of what to shoot troubled the city sportsmen. Crane Town was thought of, as a place likely to furnish an exhibition for their skill in high and lofty shooting. So, when the nests were full of half fledged young, it was visited by a party of gunners and sad hovoc wrought, nearly or quite all the young, and some of the old Herons were ruthlessly slaughtered. For two or three years a diminished number returned to nest in the old home, but the pot-hunter was ready for them and they soon gave it up. Last year, 1890, I knew of but two nests of this bird between Bernadotte and Havana, a distance, by water, of over thirty miles. Perhaps the time is not far in the future when we will have seen the last of this picturesque bird.

* While visiting a "Crane Town" in northern Indiana for eggs, several years since, we saw three piles of dead Great Blue Herons. One of the piles, on counting, showed nineteen adult birds, about equally divided as to sex, and one White Heron. The other piles we did not approach but presume they contained fully as many birds as the one examined. These birds were probably slaughtered by some of the many dude hunters (?), who, hailing from Chicago, flood this neighborhood every spring. ED.

Last month was the wettest April that Kansas has experienced in twenty-four years. The chickens are mostly ducks in that state this season.—*Star.*

FOR THE SCIENTIST.

Cloud-Burst in Arizona.

BY JOHN D. PARKER, U. S. A.

A remarkable cloud-burst ocurred last July, about seven miles west of Fort Bowie. The day was clear and sultry, and the circular storm came without warning.

Mr. Henry Fitch occupies a ranch near the Dos Cabezas range, where the cloud-burst broke over the mountains into Sulphur Spring Valley. He was at home that day, and took timely and careful observations of the storm. It passed directly in front of his house, which stands on higher ground, but the water rose rapidly within a few feet of his front gate. The storm occurred about three o'clock in the afternoon: a strange roaring in the mountains first attracting his attention. Looking toward the range, he saw dense clouds passing over the peaks, which here rise about two thousand feet above the valley. There seemed to be three strata of clouds, superimposed on each other. The lower stratum was red, the middle stratum black and the upper stratum blue. He thinks the lower stratum was composed of dust and *debris* of the storm, and the middle stratum of water. There was a fearful commotion among the clouds, and a terrible roaring and grinding in the funnel, probably of rocks, which were hurled down the mountain side in vast masses, and scattered over the valley, along the path of the storm, for two or three miles. There was a sudden condensation of vapor, and an immense outpouring of water, and the wind seemed to be irresistable. Large trees growing on the mountain's side; pine, oak and walnut, from one to two feet in diameter, were torn up by their roots, and hurled bodily down the mountain into the valley. He says there was a wall of water fifteen feet in height, and thirty rods wide, that swept down the valley toward the south-east, carrying everything before it. It washed down great quantities of corded wood into the valley, scattering it for miles, and ranchers, living along the path of the storm, have been using this wood ever since for fuel. Fortunately, the funnel passed by his house without injuring it, but there was a sheet of water left in front of his house four hundred feet wide, and in some places thirty feet deep. Pipes conveying water to his house, from a spring about a mile distant, were washed out for about five hundred feet. Two wells in the path of the storm, one fifty feet deep, were entirely filled up by the boulders, so that they could scarcely be found again.

The flood divided, about a mile down the valley, and passed on both sides of a house occupied by Mrs. Reese, which was located on higher ground. The cloud-burst was followed by a heavy rainfall, for nearly two hours, and water kept running in the gulch from the mountains for three days. The next day, Mr. Fitch rode on horseback, twelve miles down the valley to Mr. Rigg's ranch, and his horse waded through water more than three miles of the way.

Dr. Charles Wilcox, Surgeon at Fort Bowie, and a lady, were about four miles down the valley, taking a horse-back ride. As soon as they saw the storm, they rode at full speed towards the mountains, and escaped the funnel, but the general storm overtook them and gave them a thorough drenching. He thinks the storm was about a quarter of a mile in diameter, and he saw very vivid lightning playing through it. The doctor noticed a few hailstones during the storm.

Mrs. Major McGregor, with her children, was making a little pleasure trip that day in Sulphur Spring Valley. When the cloud-burst poured over the mountains, they were about three miles down

the valley, riding toward the storm. They turned instantly, and drove at full speed away from the storm, just escaping the funnel, but were soon overtaken by the general storm. She says the wind blew fitfully in fearful gusts, at times almost overturning the ambulance. For safety the party got out of the ambulance and lay down on their faces on the ground and covered themselves as best they could with their McIntoshes. Great drops of rain fell, seemingly as large as half dollars. The sun had been shining all day, but the heavens were suddenly filled with black clouds, which were tossed and tumbled about in great confusion. The funnel of the cloud, which passed near them, revolved from right to left, and threw off immense volumes of white vapor, which seemed like steam. Within the funnel there was a terrible roaring unlike anything they had ever heard. The lightning was incessant and blinding, and the thunder was one constant roar, with loud crashes now and then, that were deafening. The mules were terrible frightened, and were only prevented from running away, by the utmost efforts of the driver.

As soon as the funnel passed by them, the party climbed into the ambulance, and drove rapidly homeward. They had not proceeded far, when they met the coming rush of waters, which at first ran level with the bottom of the ambulance, but decreased in depth to about two feet, through which the mules waded for three miles, until they reached high ground. Mrs. McGregor says she saw cattle in the distance swimming in the flood. During the height of the storm the lightning seemed to play around the tires of the wheels in blue flames, while jagging blue flames darted over the prairie. The weather suddenly turned cold, and continued so until the next day. The valley road over which they had driven in the morning was level, but on their return it had been gouged out by the water in places from ten to fifteen feet deep. The party arrived at home thoroughly drenched, and have not so far expressed any desire to encounter another Arizona cloud-burst.

The writer recently examined the path of this storm, and found the valley where it passed, strewn with boulders of every imaginable variety, size and shape, from rocks probably weighing a ton, down to minute fragments. The stones evidently were not deposited in geological times to be laid bare and brought to view after the soil was washed away by the storm, as stones are often left in the bed of a creek. The stones have undoubtedly been deposited on the prairie, by some past geological force, which has left them in piles and rows, sometimes heaping them up two or three feet above the general surface of the valley. Ranchers, living in the vicinity of the storm, confirm this fact, and agree that there were no stones visible in the valley, before the cloud-burst. In some places the stones are strewn along in lines, as if they had been collected to be built into a wall, and look at a little distance as if they were a wall. In one place, several acres are completely covered with these boulders, as if they had been tumbled out of the funnel all together, by some shifting of the currents of air. There are still deep trenches along the valley, which were eroded by the rushing waters.

It is fortunate that such terrific cloud-bursts seldom occur in Arizona, for they carry destruction in their pathway.

Fort Bowie, March 24, 1891.

The *Pall Mall Gazette* man describes a recent London fog as "simply horrible." He had to "hire a boy with a lantern to find a hansom which was buried in the fog in the middle of the street," and "the cabby, lantern in hand, had to walk, leading his horse."

The Scientist.

FORMERLY THE NATURALIST.

Entered at Kansas City, Mo., for transmission through the mails at second class rates.

KANSAS CITY, MAY, 1891.

A Monthly Journal, devoted to all branches of

SCIENCE.

The Academy of Science Pub. Co.,
Publishers and Proprietors,
Kansas City, - - Missouri
R. B. Trouslot, Editor.
Associates: E. T. Keim, E. Butts, David H. Todd and Sid. J. Hare.

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The Academy's First Loss.

Since the re-organization of the Academy, nothing has occurred to mar its pleasant existance until the unexpected death of our associate and co-worker, William H. Byram. The following expressions of grief, and resolutions of respect, were approved at the Academy's regular meeting, April 21st 1891:—

Whereas, it has pleased the All-Wise Creator to remove from our midst William H. Byram, a member of this society; Therefore,

Resolved, That in his departure from earthly life, our Academy has lost a valuable worker, Science an industrious promotor, his family an affectionate head and society a useful member:

Resolved, That we extend our deepest and most sincere sympathy to the grief stricken family, who will henceforth have claims on our friendship.

EDWIN WALTERS,
E. A. HARPER,
D. H. TODD,
} Committee.

PROF. C. H. TOWNSEND has accepted the position of Entomologist to the Agricultural experimental station at Las Cruces, New Mexico.

As announced in the April SCIENTIST the Academy of Science is now permanently located at room 200, Baird Building where meetings are held fortnightly. At the last meeting, occuring Tuesday, May 5th, the members were highly entertained by Mr. F. C. Meyers, M. E., who read an interesting and instructive paper on "Probable Origin of the Mines of Missouri," same being fully illustrated by several excellent drawings.

We will not criticise the paper, or give extracts, as it will probable appear in full, in a future issue of the SCIENTIST.

A Handsome Present.

This morning the writer was the recipent of a handsome nest and contents. It came neatly wrapped in paper and was presented by the finder, Harry R. Wamsley.

After removing the paper, a fine nest of the White-rumped Shrike was disclosed. But the eggs! Great Scots! There were three of them, of a pale sky blue, streaked and blotched with bright cobalt. As the varacity of friend Wamsley was not to be questioned for a moment, here certainly was something *new*, or, a *freak*. On sharp scrutiny, however, suspicions were aroused, which were fully confirmed on glancing at W.'s smiling countenance.

Very cleverly done, indeed! A microscope could hardly detect the deception. Harvy quite properly destroyed his painted efforts and substituted the original set of six Shirke eggs, the data of which we give below:

No. 622 *a* [A. O. U.]. *Name.* White-rumped Shrike.

Locality. 1000 ft. S. and 620 ft. W. of the N. E. Cor. of Section 35; Township 50, N.; Range 32, W.; in Jackson county, Mo.

Date. May 5, 1891. *Set* 6. *Mark* A-91.

Identity. Certain. *Incubation.* Slight.

Collector. H. Walmsley.

Nest. Placed in a bunch of dead grape vines in a Walnut tree, about twenty-five feet from the ground; composed of small sticks, twigs, grasses and vines, as an outer covering over a cup of grasses and soft vegetable fiber; topped with feathers and lined with soft cow's hair.

Marine Reservations.

S. P. Langley, Secretary of the Smithsonian Institute, is making an effort to have certain islands along the Pacific coast reserved as places of refuge for marine mammals, several species of which are now threatened with extinction. He especially refers to Amak Island and to the Farallone Islands. It is reported that the Secretary of the Interior, John W. Noble, will favorably consider Prof. Langley's suggestion, to the end that the islands referred to, and possibly others, may, in the near future, be reserved for breeding grounds for the large ocean mammals, many species of which are on the verge of extermination. This project should, and will, receive the hearty endorsement of naturalists, scientists and thinking men generally, the world over.

"The Commonwealth of Australia."

"The Commonwealth of Australia," the United States of the South seas, by its own desires nominally still a part of the British empire, is, never-the-less, practically an independent republic.

With a constitution modelled partly after ours and partly after Canada's this "Commonwealth" has taken a step, the importance of which, can not be foretold by the horoscope, though, as early as 1861, we find in "The Wonderful Story of Ravalette," written by Dr. P. B. Randolph, the prediction: "India and Australia will become respectively an Empire and a Republic." The Empire may come, but the Republic is already a fact.

Here in Kansas City we have witnessed the workings of the election laws of Australia, with excellent results. In time they will, no doubt, be universal.

An exchange of practical ideas has been effected between two great Republics.

Devoid of a "Race Question" or "Negro Problem;" so remote from other nations as to preclude war, and the expence of a large army; with resources as varied and endless almost, as those of the United States, if she continues to avail herself of the experiences of other nations, coupled with her own good judgment, who can say what the future of the young commonwealth may develope?

FOR THE SCIENTIST.

Some Rare Birds of Wayne County, Michigan.

BY W. C. BROWNELL, M. D.

When Mr. Trouslot asked me for an "article," I was "just out" of an idea, and as I had no recent collecting experience to relate, I hesitated; but trust what I shall offer, in the way of a partial list, with remarks more or less in detail, of some of the rarer birds of this section, may be of interest to the Ornithological and Oological readers of the SCIENTIST.

In the vicinity of Detroit City, with its spires and domes, its tall electric light towers, its shipping, its railroading and the mighty din of wholesale traffic that characterizes the modern western town; including portions of the Detroit and Rowge rivers and the river of St. Clair, there are certain localities that seem to be favored resorts both perminent and temporary, for numerous rare species of birds. Some remaining throughout the year and others again making them their temporary resting place, while on their migratory journeys to the North and South.

During the six or seven years of my residence at Plymouth, abundant opportunity was afforded me to make some valuable additions to my collection of eggs, as well as to note the occurrence of many rare trancients. I shall also quote largely from the records of my worthy colaboraters; Messrs. Durfee of Grand Rapids formerly of Lironice; Mr. J. B. Purdy of Plymouth and Mr. Davidson of Detroit.

The first bird I shall mention, is the Large-billed Water Thrush, a breeder; an account of which is given in an article written by myself in the Oct. No. of the *Ornitholigist* and *Oologist*.

Earlier in the spring of '88, while on a hunting expedition near his home, Mr. Durfee shot several fine specimens of the Evening Grosbeak. They were doubtless on their way to their Northern breeding grounds, and when discovered were busily engaged in feeding in a small alder and willow thicket, and, to quote Mr. D.'s words "were singing a most charming note." Their appearance here in '88, is, I believe, the first on record. The ones held captive in Mr. Durfee's collection cannot be missed from nature and they, in their lifeless, yet life-like state, cannot pine for their northern haunts, and as they are, they remain a lasting page in a chapter of that interesting science under which they are classified. Nesting far to the north amid those trackless forests of fir and pine, at the extreme northern limit of vegetation, only coming down when the bleak, cold blasts of winter render the whole region almost uninhabitable; returning again at early spring, again to rear their kind.

Rare and beautiful singing bird;
By the woodland wanderer alone is he heard;
He seeks his home in the forests of pine,
And only comes down when the midnight sun of the Esquemaux refuses to shine.

Traversing a small inland marshy tract near my home during the early season of '88, I chanced to find what I then supposed to be the nest of the Clapper Rail. One egg was in the nest, and for ten days I watched, counting each day an additional egg. So familiar did the bird become to my visits, that she would not leave the nest at my approach, but would allow me to pet her, and only when lifted off her eggs would she scream and cackle in a most ludricous manner, finally darting away among the reeds and grass, coming out upon the bank, where she would walk about in a very dignified manner, till I left the nest, when she would immediately return. I had at that time a large series of Clapper Rail's eggs and I declined taking this set, hop-

ing that the old ones would return another year. Nine little black cubbs of Rails left the nest, leaving an egg that did not hatch. I saw them as they left the nest the day they hatched and that was the last I ever saw of old or young, as I think they left that night and have never returned. I gave the remaining egg to Mr. Purdy, as he consented to save it; what was our chagrin, however, when we learned that they were not Clopper Rails, which bird is confined to the ocean marshes, but the King or Red-breasted Rail. Not a rare bird in some localities, but the only one ever known to breed here, and we had done well had we preserved the whole set.

Solitary specimens of the Turkey Buzzard are occasionally seen. Soaring high up, often appearing as mere specks against the deep blue of endless space; rarely coming within rifle range of the earth. Not long ago a large male Buzzard was killed near Plymouth, and after being wondered at by the hay-seed native who did the killing, he preserved the bird in the stomachs of his winter pork. Had he but been wise in his day and generation he could have disposed of the Buzzard to some of the taxidermal enthusiasts about Plymouth to far better profit to himself, than feeding it to his hogs, at the present feather weight price of even Buzzard fed swine meat.

Following our lakes and rivers, the Loon or Northern Diver is not uncommonly seen and numerous instances are on record of its having bred in Wayne and adjacent counties. In 1886 Mr. Davidson presented me with two fine sets of Loon's eggs taken by himself, at Grass Island, in the Detroit river. Were space allowed me, I would detail a description of its nesting habits, as Mr. Davidson described them to me in the letter accompanyed the eggs. He gave the bird great credit for cuuning and sagacity, both in selecting its nesting site, eluding observation and diverting the finders attention from its nest, finally rising from the water and circling with the ease of a swallow, high overhead, uttering repeatedly, its shrill cry of apprehension and distress. The nest is situated among the rank reeds in shallow water. Built high and conical, much resembling the winter house of the Musk-rat, and in fact, the Loon often appropriates the deserted rat houses and deposits its accompaniment on the flattened top. The eggs, usually two in number, are about the size and shape of large Eider Duck's eggs, having a dark coffee collored groundwork, spotted and splashed with deeper shades of brown and black.

The Strigidæ and Falconidæ flourish in this section. Seven varieties of the former occur of which four are breeders, viz: Great-horned, Barred, Little Screech and Saw-Whet. Of the latter, ten varieties occur, viz: Pigeon Hawk, Sparrow Hawk, American Osprey, Marsh Hawk, Coopers Hawk, Shark Shinned Hawk, American Goshawk, Red-tailed Hawk, Red-shouldered Hawk and the Broad-winged Hawk. All are breeders, except the Pigeon, the Osprey and the American Goshawk, which are on our list as doubtful.

Mr. Davidson took a fine set of six eggs of the Saw-whet Owl, together with the female bird, at Walled Lake, this past season. It is one exceedingly rare.

During the migratory seasons, thousands of Warbles assemble in the hazel brush wastes along our small streams, and many a morning in early spring, when the first signs of its coming are on tree and bush, when the "Soft Maple" in the city streets and the puss willow in the country way-side first begin to put forth their buds and leaving home I started forth in company with some "congenial spirit" with basket of cotton and collecting gun, for a rare day's sport, feeling confident of adding new and rare speci-

men's to my collection. Of the warblers that breed with us, the Golden-winged, the Chestnut-sided and the Cerulean are the most note worthy. Last season we added the Short-billed Marsh Wren to our list of breeders.

The thing that is occupying our minds at present is the preparation of a bill to extend the protection of the law to certain species of Hawks and Owls. It is shameful to note the wanton destruction by man of these useful birds, owing largely to an ungrounded predjudice that exists in the minds of "small boys" and farmers toward these birds, whose very existence depends on the destruction of the farmer's greatest enemies: mice, gophers, beetles, etc. The Bulletin now nearly completed on the Hawks and Owls of North America, published for free distribution by the Agricultural department, should be procured and read by everyone interested in the preservation of our native birds. It will be profusely illustrated and is worth a 2c stamp.

I find I have omitted the mention of an old male Bald Eagle that my father and myself saw to our great wonder, as he majestically sailed past, scarcely one hundred feet from where we were at work in the woods on Rowge river flats, in the winter of '85. Neither of us had ever seen so large a bird and the audible rush of his wings, as they beat the air, inspired us with awe and doubtless laboring under momentary excitement my paternal ancester shouted "give it to him boy!" and away he started in full pursuit, his most formiable weapon being a cross-cut saw. As the Eagle, however, began to grow fainter and more faint to our vision as he wended his lonely way toward the setting sun, father came back, but the spirit of industry had received a setback and we "silently picked up our tools and wended our solemn way homeward."

Exchanges and Reviews.

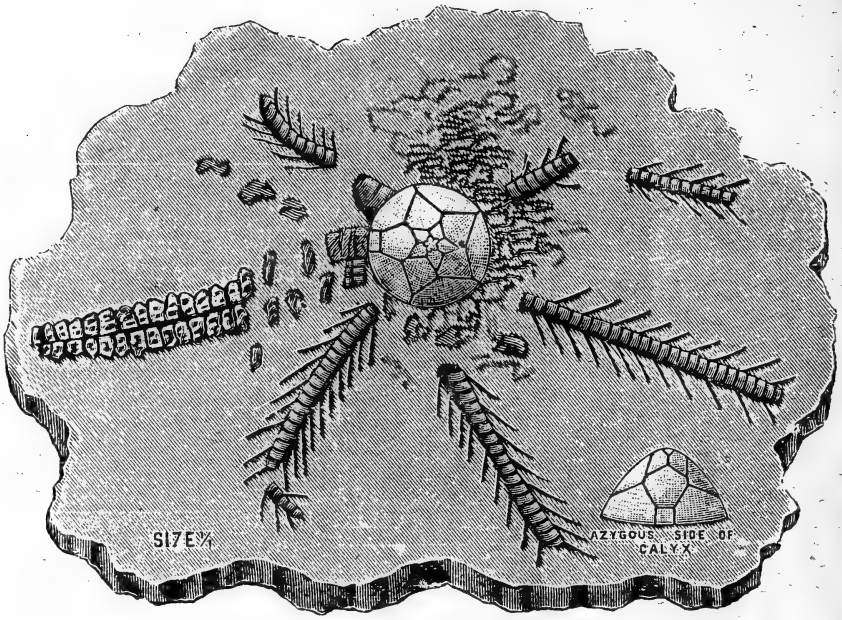
My Life with Stanley's Rear Guard, by Herbert Ward, New York, Charles L. Webster & Company.

The interest shown by the reading public in all that pertains to the "Dark Continent" will find in this work, as a continuation of the controversy commenced by the friends of Major Bartelot and James S. Jameson. The author, states that the work was written upon Mr. Stanley's suggestion, and deals with the different matters in dispute. A sketch map of the route is a part of the work which aids the reader to follow the Congo river valley. The book should find a place on every library.

The Future of Science, by Ernest Renan Boston, Roberts Bros., 1891:

To the American student, accustomed to taking one of the phaces of scientific study, either for or against the reconciliation of the teaching of science and religion, the work of the eminent French philologist, will afford much matter for careful thought. Trained for the church, the author achieved great renown in the field of religious controvesal literatare, but soon threw off the yoke of the church upon the grounds that blind acceptance of the mandates of the church fettered the mind and reduced one to a state of credulity. He says; "To sum up: if through the constant labour of the Nineteenth century the knowledge of facts has been considerably increased, the destiny of mankind has on the other hand become more obscure than ever. Science will always remain the gratification of the noblest craving of our nature; curiosity. It protects him against error, though it may not reveal the truth to him, but there is an advantage in being certein not being duped."

The mechanical work of the book is to be highly commended—large clear type,—and it will prove a valuable addition to the library.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THE KANSAS CITY

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Official Organ of the Kansas City Academy of Science.

VOL. V. KANSAS CITY, MO., JUNE, 1891. NO. 6

FORMERLY

THE NATURALIST.

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KANSAS CITY, MO.,
ACADEMY OF SCIENCE PUB. CO.,
Publishers.

SUBSCRIPTION BLANK

FOR

The Scientist.

Official Organ KANSAS CITY ACADEMY OF SCIENCE.

Published Monthly at $1.00 per year; Foreign countries $1.10; Single Nos. 10c.

NOTE.—Make all P. O. Money Orders, Drafts, and Express Orders payable to, and address all communications to Editor SCIENTIST, Kansas City, Mo.

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FOR THE SCIENTIST.

The Mushroom and the Arrow.

BY GEO. C. STEALEY.

Green was the grass, the rocks were wet
In the hollow; the morning, mild;
In leafy arch the old oaks met,
And the crazy crow grew crazier yet,
'Till the gloomy traveler smiled;
Smiled as he stopped his horse to rest,
To nibble where the grass was best,
And from him wandered forth in quest
Wherewith to be beguiled.

By chance an arrow-head he found
Under a mushroom's haunted dome,
An old war arrow, in the wound
Designed to break; an ancient tome
Of unwrit tales of war and crime,
Its angles worn by centuries slow,
By summer's rain, by winter's snow,
Since when the strong arm bent the bow
For the long flight through time.

Mushroom, in an hour you grew
And to-morrow will be dead;
Ten thousand years, perhaps, the dew
Has fallen on the arrow head.
Old arrow, formed for deadly feuds,
What shade around the mushroom broods
Of hunters stealing through the woods?
Made they the fossil humming bird
Fly from a bloom, part of the breeze,
Or Behemoth through Yosemite
Dash in terror, breaking trees?

The evil deed, 'tis truly said,
Lives; the good with our bones is laid;
An to that proof the arrow head
A sermon in stone is made.
Who gave it form, of what estate?
Though charity knew that hand so well
That of his bounty thousands tell,
Yet in that soul a leaven fell,
Slept cruelty, malice and hate.

Sang he an Aryan song,
That old barbaric artisan,
Or droned he but in Nature's tongue,
As down the edge his eye he ran,
His sound for joy the water-fall's
His rage expressed in wolf-like snarls,
His threatening made with snake-like breath,
The arrow head his thought for death?

What is its date? From bordering shade
Was silent deadly vengeance paid,
When sweeping down the cradled glade
Beneath the oaks of other years,
On burganet and dancing blade,
On crucifix, on axe and spears
Alternate sun and shadow plays,
When to the cornet's quivering praise,
Come prancing on their golden bays,
The Spanish cavaliers?

The fane of the sun at Cuzco,
The whited ruins at Palenque,
Or Rameses in his marble,
Where the scarabeus lay,
Though laughter once around them rang
And many kings thy greatestness sang,
Rameses, Mer-Amen great king!
Less durable were they.

On its sides there is no writing,
Yet it bears a wondrous tale,
Dark, dark ages dimly lighting,
Older than the horned Baal,
Before the Kyber Pass was trod,
And e'er the Indus swam with blood,
Before the Egyptian carved a god
On Abou Simbel Pale.

The mushroom's full grown in a night,
The arrow's ancient in its prime,
Whereon, whereon shall we write
That shall like that endure through time?
For steam and steel and massive wheel
And rail and wire will rust away
And book and shaft anon will feel
The sapping marches of decay,
And Brooklyn Bridge or Appian Way
Leave but a ridge to tell the tale.

Whereon, whereon will he write,
On cylinder or costly urn
That like the mushroom in a night
Will not to elements return?
"The nations tremble at my power,
Uncounted Cossack horsemen scour
Six thousand guarding cannon lower
Along my snowy frontier line,
And from my ice a flood of war
Three million gleaming bayonets pour,
The whole earth dreads the Great White Tzar,
The throne of Power is mine.

And whereon shall old England write,
What ocean crown with gems empearled?
"The Cossack and the Muscovite,
The haunting nightmare of the world,
Awe not the mistress of the sea;
No Asian tyrant makes at me;
My vengeance as an iron rod
On stubborn Alexandria fell,
Wrecked by the havoc of my shell,
And as the awful Hun, my will
Is as a hammer of God."

We found no hope on buried things,
In pyramid or hidden cave;
No sculptured column runed for kings,
Nor collar worn by slave.
The silky stars and stripes may wave
Ten thousand years, so mote it be,
And the eagle spread his splendid wings
O'er the home of the free.

Proceedings Kansas City Academy of Science.
April 7, 1891.

The Probable Origin of the Ore Deposits in the Mines of Missouri.

By F. C. Meyer, M. E.

I know there are different theories in regard to ore deposits, but I adhere to the theory, that nearly all mineral ores, or rather the solution in which they were contained, originally had to pass through the archæan formation. This evidently took place at different places and at nearly all the different periods of geological formations.

It furthermore appears, that there are no mineral ore deposits in the rocks of the archæan period, no matter how contorted they may be, unless by subsequent force these rocks were broken again and then allowed the solutions containing the minerals to pass through them, during which time some minerals may have been deposited on the walls of the channel.

In consequence of many circumstances, it is supposed that at the earliest time the earth was a mass of very hot material more or less fluid; when this began to cool it must have formed a more or less even crust, but as the cooling gradually proceeded, this crust shrank and

folded; at the same time, while the cooling continued, there must have been formed also, a stratification below the folded rocks as well as above. As remarked before, in my opinion, no minerals are found in the rocks of the archæan period, unless they were subsequently disturbed, and therefore, the lower stratifications must also have been broken before the mineral could pass through, and this must have been below the lowest stratification.

In mountainous countries where dikes and igneous rocks are, this theory can easily be explained, but down in Missouri the mineral is found in a perfectly level country. The stratified rocks are all in place, only slightly altered by erosions.

Whenever in a mineral country, I try to find an explanation for the manner in which the minerals were deposited, and, naturally try to have the explanation in accordance with the theory previously advanced.

Before examining the mineral deposits in Missouri, I tried to obtain information as to the cause of such deposits and how they were made. There may be other theories advanced by competent men, nevertheless, I have not been able to find any, and all I could learn was, that some said, there were horizontal veins or deposits; others that mineral deposits were caused by subterranean rivers, etc., etc. Nevertheless, they were all of the opinion, and it seemed to be the universal belief among mining men around Joplin and that section of the country, that it was simply a matter of "luck" to find zinc or lead ores, and that a person is justified in sinking a shaft anywhere, and is liable to strike ore, as it is all "Mineral Land."

There are no doubt cases "where ignorance is bliss" and while it may have happened that some people have struck ore in that manner I could not accept the theory that there was no rule for its deposition.

So a couple of years ago when called upon to made an examination of some mining property, it was with considerable interest that I made the visit, and here is my experience:

The work on the mine was a shaft about 130 feet deep. In the bottom were about 200 feet of drifts in various directions. In going down, we found the timber in the shaft gradually pressed together; the deeper we went the narrower the shaft. The drifts, which evidently had been seven feet high, were so low in places that we had to creep in order to get through them; this was caused by the pressure of the soft ground upon the timbers. Near the shaft I noticed a drift, full of mud to the roof, which evidently had been pressed in between the timbers. Where they took out the mineral it was imbedded in a clay substance. As remarked before, the drifts ran irregularly, that is at least a hundred feet in an east and westerly direction and also that much or more in a north and southerly direction; everywhere was this soft material. Coming to the surface again, I looked at the surroundings and following the course of various so-called diggings, went down a slope towards a river bottom. Out of all these diggings and also out of a shaft near the river bottom ninety-seven feet deep a material was brought out similar to that described in the other mine. On both sides of me at a distance of 60 to 150 feet were bluffs of white lime rocks laying perfectly undisturbed in their original places. This at once convinced me that where this slope was there must be a fissure at least 200 feet wide, and it did not then take long to determine its course. In looking further over the country these fissures appeared very irregular, and naturally I was trying to find an explanation for their existence. We will sup-

pose that an earthquake had occurred at a given point. The strength of the motion of the shock would start equally in all directions, but coming through the rocks of the different periods they naturally must have taken different courses which were directed by the strength and situation of the rocks. It consequently does appear that the effects of this motion came to the surface with different force at different places and fissured the rocks where it passed through. At some places the rocks were apparently entirely undisturbed, yet very much fractured notwithstanding no lead or zinc was found. The rocks were greatly stained by peroxyde of iron showing that waters containing the same had percolated through them. This may have been the effect of two or more original shocks or one where the force of motion was divided and appeared at different places of the surface. The oscillating motion spread the force, and it must have become weaker and weaker the further it got away from the original point, consequently as they could not penetrate the lower stratifications again, they became shorter and shorter and finally only shattered the surface rocks, and in many instances the force became so weak that it could not fracture the rocks across a previous fissure. So far I have explained how these fissures probably occur, and it remains to find an explanation of their enormous widths. Maintaining the idea that the minerals were in solution and passed through the archælan formation, I will remark here, that whenever minerals were found in these rocks, they were deposited in cavities which evidently were caused by the *shifting* or the *breaking* of its stratification, while in other rocks the vein matter generally is closely connected with the walls and frequently shows very plainly that the bed rock had been altered during the time when mineral was deposited, and in fact where it has been altered the most, the mineral deposits generally are the best. We know that under certain conditions minerals may be held in solution. Of course as this condition changes, such minerals will take other forms and likely precipitate. As the rocks of the archælan period evidently had been subjected to great heat and are not very changeable by water, the solutions passing through them were changed but very little, therefore the mineral deposits therein were only caused by the less pressure and temperature; but as soon as these solutions passed through rocks which are susceptible of dissolutions, the solutions would readily dissolve part of that rock and consequently would greatly alter the original condition of the solution. We know very well that, for instance, lime rock is very susceptible to dissolution by water, consequently minerals may be most expected between the lime rocks. It appears to me that such has taken place in the southern part of Missouri. The mineral waters naturally took their course through the fissures caused by an earthquake as before described. It is also natural, that where the force was the greatest, the fissure was the widest and consequently there the solution could pass through the most readily. Originally, the fissures may not have been wider than six inches, but the waters gradually changed the rocks at some places to a width from two hundred to three hundred feet. It is also evident, that a great deal of alteration of the solution took place in the lower strata, and consequently very little mineral was left in the water by the time it came near the surface, and therefore, at those places near the surface, as described above, very little or no mineral can be expected; nevertheless, as it may be by various local causes, that the mineral solution may have been forced out of its original channel, it may have caused ore deposits under rock in place. Such places may have been struck by parties sinking

through solid rock, hence, caused the belief, that mineral may be found promiscuously.

At various times I have been told, that flint is a good indication of mineral, and when people who were sinking through solid rock struck nodules of flint, they erroneously think they will find zinc. As a matter of fact, there are a great many nodules of flint in some of the lime rocks. In or near a fissure, the water frequently dissolves the lime around the insoluble flint. Now, because the zinc is found around the flint, they take flint for a good indication while in fact it is very innocent of being either a good or bad indication. How the leads attained such width has already been explained. The strata of lime rock frequently changes off to strata of clay and shales, the alteration of the lime rock made the substance very soft where the fissures are. This consequently caused the erosions there to be the deepest, and in nearly all instances where I suppose that there are such fissures, they were found to be the channels of the surface water, but as the veins extended above the present level it appears that the softer vein matter was washed away and left some of the harder pieces of lead and zinc ore exposed to the surface. Many, though not all, river beds in southern Missouri are leads. I certainly believe that there are such leads under some river bottoms or creeks which further development will expose sooner or later. There may be different theories and others may not concur with my views, though in many instances where my opinion was based upon the foregoing observations as well as according to the theory above defined, my statements have been verified not only in instances where I maintained no mineral could be found, but also where I had indicated the most mineral was to be expected.

Proceedings Kansas City Academy of Science.

Scientific Value of Fossils.

By Edwin Walters.

1. Fossils serve as an index to historical geology.

1. Environments during life.

It is fair to assume that results obtained in the present and those recorded of the past, when similar, were produced by like, or somewhat similar, causes. By a study of modern organic forms, and the environments that modify them, we are enabled to determine, by the aid of comparative anatomy, chemistry and other sciences, the completed forms and the environments of the plants and animals whose fragmentary fossil remains we find preserved in the rocks.

Certain forms of organic life must always be associated with moist and warm or hot climates. We know that this is true in the present, hence, we assume that the same laws of harmony and association obtained in prehistoric or geological times. At present, we know that the gigantic ferns, palms, equisitæ etc are peculiar to warm and moist climates hence, we assume, or conclude, from a study of the mammoth fossils remains of *sigillaria lepidodendron, calamites, equisitæ*, palms and other plants of the coal age that the climate of the carboniferous period must have been warm and moist to a degree unknown in modern times.

2. Means Of Deposition.

By the application of known law, it is possible from the study of fossils, to determine their medium of deposition. Sometimes this is found to be salt water, at other times fresh or brackish water. Sometimes it is fair to assume that the *situ* of fossils is attributable to wind, waves or even to the agency of man. Salt and fresh water specimens are easily distinguished. Those peculiar to brackish waters are usually at, or near

the mouths of creeks or rivers where salt and fresh waters come in contact and are united. There are many species that are usually assigned to such waters. Among them may be mentioned the different species of *myalina*.

By a careful study of fossils and other organic remains *in situ*, it is possible to determine the directions of the currents, if any entered, as vehicles, in their deposition.

II. Index To Climate.

By this means prehistoric and extinct rivers and other bodies of water may be outlined and determined with a high degree of confidence in the conclusions reached.

As before intimated, fossils afford an index to the climate of the geological ages of the past. From them it is possible to determine, or at least approximate, the degree of temperature and moisture present and prevailing at the time they were endowed with life. They also indicate the presence or absence of light that was associated with their other life conditions.

2. Fossils indicate the climatic changes of a given locality. A series of rocks, with the fossils they contain, may indicate the intense cold of the glacial epoch. Other rocks and fossils in the same neighborhood may indicate that they are a result of the warm carboniferous climate—peculiar to the coal age or even of the intense heat that gave character to the igneous rocks, *e. g.*, the mammoth, etc. in Siberia.

III. Index to Historical Zoology and Botany.

1. By a comparison of the different types of plants and animals, as preserved in the rocks, a comprehensive view of these subjects may be had. When compared, or contrasted, with present types and standards, conclusions can be reached regarding the evolution, progression or retrogression of species. By such comparisons, we conclude that some orders and genera have changed rapidly in their comprehensive types, while others have remained almost permanent and fixed for untold ages. As examples of the former, take the ostrea and the equista. The modern "Saddle Rock" or "N. Y. Count" oyster would not recognize his great-grandfather—the *Ostrei marthii*—if he were to meet him in the road!

Restore, in imagination, the little 16-hoofed fossil horse—not larger than a jack rabbit—and place him beside a modern Clydesdale, Norman or thoroughbred.

Contrast the giant saurian whose remains were found near Canon City, Colorado and now in the Smithsonian Museum at Washington, with the pigmy lizard by the roadside to-day! The one 76 feet the other 2 inches in length!

In the way of vegetable fossils, take one of the giant *sigillaria* of southern Kansas, that stood 100 feet tall and 6 ft. in diameter, and stand it, in imagination, by the side of a "maiden hair," polypodium or other fern of to-day!

A thorough investigation into the causes that produced these wonderful changes in organic forms will lead to an understanding of the true relations of fossil flora and fauna to the types of to-day. Thus will a complete view of historical botany and zoology be had. Such an investigation will settle all, or at least the main points involved in the great question of evolution. A study of the specimens afforded by the fossil world will determine whether progression or retrogression has been the rule with organized matter. Some of the examples given above indicate the one and some the other. Which accord with the rule? Which are exceptions? Are there limits beyond which types will not develop? It seems to very fully settled that one species may be evolved from another, but may one genus or order evolve from another? Are the lines that divide

genera and orders never crossed by reason of change of environments?

These, and a score of other important scientific questions can only be answered and satisfactorily settled by an impartial investigation of the fossil remains preserved in the rocks.

As an example of the permanency of types, take the echinus of the cretaceous formations of Texas, and elsewhere, and compare it with the modern "sea-urchin." They are almost identical, though separated by millions of years!

The lingula affords another example of this kind. In the vegetable world, the fossil leaf prints in the Dakota sandstone prove that the sassafras and magnolia of the cretaceous period were quite similar to these species at the present time.

The conclusions that may be fairly reached from a study of fossils, in the light of to-day, with the present development of science and facts already collected, are that organic forms have continuously changed to harmonize with their environments, and that these forms have been higher or lower in harmony with the law of adaptation and not according to the law of progression.

The Intense Brilliancy of Lightning.

One consequence of the short duration of lightning is an apparent diminution of its brilliancy. It has been proven that light can not produce its full effect on the eye unless it remains at least as long as one tenth of a second; but lightning lasts only the ten-thousandth part of a second, and it follows from this that we see is one-hundred thousand times less bright than it really is. When we recollect that even thus diminished its brilliancy is such as to cause temporary blindness if too closely watched, we may feel grateful that we can not see it in its true vividness, for our human powers of vision would be too weak to bear such a sudden and over-whelming illumination. — *Gaillard's "Electricity."*

FOR THE K. C. SCIENTIST.

Drawing in the Public Schools.

BY. SID J. HARE.

It has been said that drawing is the alphabet of art. There is hardly an occupation that we may choose to follow, that does not, in some of its branches, require either the ability to draw or a knowledge of drawing, that will enable us to understand, or more properly speaking, read the drawings made by others.

Mr. Chas. B. Stetson said "Almost every thing that is well made is made from a drawing; in the construction of buildings, shops, machinery, bridges, and in fact everything, it is not enough that there be draughtsmen to make drawings; the workmen who are to construct these objects should be able without the help of a foreman to interpret the drawings furnished him for his guidance." He also said "The workman who lacks this knowledge and this ability must work under the constant supervision of another, doing less and inferior work and receiving inferior wages."

In Europe, drawing is required to be taught in all schools, and free schools of art are open both in the daytime and evening, where those who wish may study under the direction of the best teachers. Mr. Stetson remarks that it is the educated, skilled labor of Europe and not the pauper labor as many believe, which America has reason to fear and against which she can defend herself only by educating her workmen equally as well.

"Those who can learn to write can learn to draw." England has proven this in her schools where one-hundred per cent of the scholars learned to draw fairly well and many remarkably well.

Drawing develops the art-loving and criticising principles in us, and until we have this we cannot appreciate art collections, or enjoy the true thoughts of the artist, any more than one who cannot read, can enjoy a fine library of choice literature.

Drawing may be only copying, but art is more; it is the result of original ideas, yet to become an artist or an artisan, we must first learn to draw, and to accomplish this we should begin drawing when we begin to write, and as we advance and branch out in the one we should do the same in the other; then, when our school work is done ,we can feel assured that though we are not expert draughtsmen, we have at least a good foundation upon which to build, no matter what business or profession we may choose to follow. To-day, our public school systems neglect to build this foundation, not even digging the trench. It is true that some of the eastern states have made drawing compulsory in the public schools and art schools of design are open free to all. Massachusetts has made a wonderful stride in the study of art during the last decade. The leading Colleges and Universities now teach drawing in connection with those studies that require it; as architecture, mechanical, civil and mining engineering, while a few teach it in its higher grades.

As American people, we are the offspring of Europeans, possessing the combined inventive genius of all, and with the Yankee knack of applying our knowledge to the ends desired, we are destined to excel in whatever we undertake. It is to be hoped that the state legislatures of this progressive Union will pass such laws, as are necessary to establish art schools in every city or town of any importance throughout the United States, and require drawing taught in all public schools, in such a manner that the scholars may derive some practical good therefrom. Once started, the beneficial results will soon be seen as it was in England from 1851 to 1857. At the Universal Exhibition in 1851 England was next to last in art display, the United States being last; in 1876 she was one of the foremost. America can make even a greater stride than this, if the work is only started in the proper way; in the schools first, and in the lowest grades where writing and drawing should be combined—drawing from familiar objects, not merely copying lines in a book.

FOR THE SCIENTIST.

Popular Superstitions.

BY R. B TROUSLOT.

The world is full of thoughtful students. The old time dogmas are one by one being exploded and, thanks to the careful study and patient research of these self-appointed observers, we are constantly learning something new.

Dr. Strode's reference, in his article in the MAY SCIENTIST, to the antiquated belief of an old ignoramus, who still fondly clings to the idea that "Swallows and Swifts hibernate in the mud, at the bottoms of rivers during the winter season, and that the Juncos turn into Sparrows in the summer and back to Juncos when winter approaches" recalls to mind a number of other absurd theories that educated people no longer countenance. The first is the Joint-snake, or, as it is more commonly called, Glass-snake, which, after throwing away his tail, is credited with "hitching on" to it again. It is nothing unusual for otherwise well-read and intelligent people, to assert with all the force of conviction, that these snakes will, on being suddenly disturbed, throw themselves into numerous pieces and eventually, always after the observer has retired, jump back together again. To such an extent has this "yarn" been circulated, that the average school boy repeats it with apparent candor. As a matter of fact, the throwing or breaking apart process only occurs when frightened, and is caused by a sudden contraction of the muscles of the tail, which cause it to break off and usually into several pieces as if it were brittle. According to the classification of most authorities it is not a snake at all, but a lizard. Mr. B. W. Drinkard a member of the Academy, has one of these handsome little fellows in captivity. Some interesting facts not generally known concerning the habits of this lizard will probably result from the forced confinement of this specimen.

Who has not heard the backwoods hunter entertain his open-mouthed and equally as ignorant audience, with stories of our "gentle and inoffensive" Porcupine, who "threw his quills until the dogs were covered and left in disgust, howling with pain", or some other "bosh" to the same effect. How positively he makes the assertion. There can be no doubt that hunters of this ilk frequently say "bear" when they have seen nothing more formidable than a harmless "ground-hogs." Nature armoured our Porcupine in a manner, that, when excited and with spines raised, woe to the quadruped, or biped either for that matter, who comes in contact with this bundle of prickers. "Porky's" body is covered with a thick layer of fat, in which the quills or spines are rather insecurely fastened. Each spine has a set of minute barbs at the outer end. But touch a spine and it sticks, and can only be removed by force. A dog or fox that lacks experience and undertakes a meal at the Porcupine's expense, usually ends by filling with spines not only his mouth, but his head and paws as well, and not unfrequently death results from his temerity.

The quick eye of a frolicking school boy detects a moving thread-like object in a roadside puddle left by a recent shower. Lo! He has discovered a horsehair possessing life. The hair-snake is captured and critically examined by all the school children; teachers as well. Even if the teachers have given Zoology some attention and know better, many of them do not take sufficient interest in the matter to contradict the old time nonsense, and the boys go home, procure a number of horsehairs which are put afloat in the "rain-water" barrel or some other receptacle, and patiently watched for a number of days. Of course they never come to life but the boys having positively seen *one* "live horsehair" grow up and tell the same ridiculous tale to their children. Like the Glass-snake this tiny worm is not a snake at all, being placed by Naturalists among the Vermes. They are closely allied to the fatal trichina, though they develope in much lower forms of animal life, leaving them on arriving at maturity.

Another exploded old time notion is that owls see only during the night, whereas they are now credited with seeing equally as well during the day as by night. That Owls turn their heads round and round until twisted off, in their efforts to watch an enemy, who "knowing his bird" is repeatedly walking around his prey, impatiently awaiting the fall of the head that he may enjoy a dainty meal, is equally as rank rubbish.

Notwithstanding the assertion in Wood's Natural History, that Rattlesnakes and Burrowing Owls live in Prairie Dogs' burrows "finding an easy subsistence off the young dogs," it is known to a certainty that the rattlers and owls "in all cases occupy the deserted burrows of these quadrupeds, not living in common with them as usually supposed." *

The emblem of our country, the Bald Eagle, is no longer considered a noble bird but is known as an ignominious thief.

Years ago the natives in preparing skins of the Birds of Paradise, for foreign markets, for some reason, best known to themselves, always removed the legs, and in such a manner that an examination of the skins supported the deception, so that for many years these birds were supposed to be legless.

That the wishbone of a goose can in any way indicate the future condition of the weather, is as hopelessly untrue as that, if the Woodchuck sees his shadow on the 2nd day of February we may expect a cold and backward spring. Likewise we may accept the "charm" theory of snakes with considerable doubt and it is now the belief of Naturalists that the Opossum does not "play 'possum" but is simply paralyzed with fear.

Our Atlantic Seals possess large and intelligent eyes and as some species have manes it is not to be wondered at, that ignorant Eskimo and superstitious sailors, on seeing these animals unexpectedly emerge from the sea, with their manes dripping with water and uttering sounds strangely human, should mis-

* Cues.

take them for human beings. This, no doubt, gave rise to the mermaid, merman, siren, triton and sea nymph legends. The so-called mermaids to be seen in dime museums are all manufactured.

The story of the Ibex dropping from lofty precipices and lighting on its horns as composedly as we would jump a few feet, has long since ceased to be considered anything but a "fake" though early Naturalists often reported it as a fact.

"Blind as a mole" no longer prevails, as Moles have eyes though they are small and well hidden in the thick coat of soft fur covering their head and body.

Thus, gradually, the fiction and romance connected with and surrounding many of our animals, is succombing as reason and study penetrates and disperses the fog of ignorance and superstition.

Death Notices.

JOHN C. CAHOON, a young Naturalist, of considerable promise, met a premature death by falling from Shag Roost Cliff at St Johns while collecting. His home was near Taunton, Mass.

Edward E. Height, another enthusiastic young Scientist, formerly of Mound City, Kans., died of consumption at his parents home in Riverside, Cal.

Mr. Height was an expert Taxidermist and an excellent Botanist.

The eminent Philadelphia Scientist, Prof. Joseph Leidy, M. D., LL. D., died at his home in Philadelphia, April 30th during his sixty-ninth year.

Almost every branch of Zoological literture is indebted to him for valuable additions.

It will add more enjoyment in life whatever our business or profession may be, than can be told in words, to have some one branch of science or nature so well understood as to enable us to perceive all its beauties.— *B. K. Pierce, D. D.*

The White-Rumped Shrike as a Pet.

In the Spring of 1877 the writer found a young "Butcher-bird" in the woods just south of Kansas City. He was taken home, well cared for and soon became a family pet. He never knew what it was to be caged and always took his food from our hands. He soon learned to expect food, a grasshopper, or a fly from those coming in, and the call of his name, "Pedro, Pedro" would bring him to my shoulder from any part of the house. Pedro was very mischievious, stealing thimbles and such things as he could carry, flying with them to his perch over a window in the dining room, where he would set and turn his head from side to side with an air of great satisfaction. Whenever the sewing machine was being used, an old Eliptic, Pedro would light on the moving arm, and there bob up and down seemingly in great enjoyment. As summer advanced, he was permitted to go into the yard, where he caught grasshoppers for himself, finally, staying out all day, only returning to get a drink or to his perch, at night. Many amusing incidents occured while he remained in the neighborhood. One "wash-day" we noticed that a large number of the clothes pins (the old double ones) held grasshoppers wedged in tightly, and while wondering how they came there, Pedro lighted on the line with a large grasshopper and shoved him well down into the slot. He was easily called from the house top and would light on my hand much to the amazement of passersby. The school children soon formed his acquaintance and would call him down for an insect or worm. No doubt he was called once too often, for one evening he failed to return. He was home at noon, lighting on the screen-door, where he continued his shrill cry until I gave him a glass of water on which he perched and drank, then flew away, and we never saw him again.

S. J. H.

The Scientist.

FORMERLY THE NATURALIST.

Entered at Kansas City, Mo., for transmission through the mails at second class rates.

KANSAS CITY, JUNE, 1891.

A Monthly Journal, devoted to all branches of

SCIENCE.

The Academy of Science Pub. Co.,
Publishers and Proprietors,
Kansas City, - - Missouri.
R. B. Trouslot, Editor.
Associates: E. T. Keim, E. Butts, David H. Todd and Sid. J. Hare.

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Aluminum.

Aluminum is a white, ductile, metalic substance, resembling silver. It is susceptible of a higher polish than silver, and is not affected by atmospheric changes. Sulphur, nitric acid and diluted sulphuric acid do not injure it in the least. A solution of caustic potash or soda, however, will dissolve the metal with great ease. It is also readily soluble in dilute hydrochlaric acid with evolution of hydrogen.

This peculiar metal was first discovered in 1828 by Wohler, who obtained it from chloride. Thirty years later the mode of production was so simplified by Deville that it could be produced in sufficient quantities for manufacturing purposes. The process was, never-the-less, too expensive to warrant a very extensive use of the new metal, the price, until recently, being as high as $13.00 a pound. By an improved process of electrolysis, fully protected by letters patent, aluminum is now obtained from clay, so easily, that it has been sold in any quantity desired for from $1.50 to $2.00 a pound: recently competion has reduced the price to a dollar a pound, and from present indication, we are warranted in stating that the price will still see a remarkable reduction.

The new metal is extremely malleable and ductile, and may be rolled into thin sheets, or drawn into fine wire. By cold hammering it becomes hard as soft iron, but by fusion may be softened again. It is very light, being only two and one-half times heavier than water; the weight of a given bulk of Aluminum being 1, iron is 2.9 times as heavy; copper, 3.6 times as heavy; nickel, 3.5 times as heavy; silver, 4 times as heavy; lead, 4.8 times as heavy; gold, 7.7 times as heavy; and platinum 9 times as heavy.

With the cheapening of manufacture this valuable metal is coming rapidly to the front, and will, no doubt, revolutionize

the mechanical world. It is already used for ornaments, jewelry, medals, cutlery, culinary articles, floors, pens, match-boxes, thimbles, etc., etc.

Future of the Phonograph.

The Phonograph was launched into Missouri with "great expectations," but, owing either to mis-management on the part of its backers, or to the rapidity with which changes and improvements were made during its infancy, it has gradually faded from view and is now only used by several persons in Kansas City.

This need not be discouraging, however, for, if we correctly interpret the 'handwriting on the wall," the future phonograph will be as superior to the machine even of to-day, as the kodak's work excels the old time daguerreo-type. The revelations made by science during the past century are astonishing; to predict for the future would be futile.

No one will dispute for a moment that the phonograph is a wonderful peace of mechanism. Its developement from the original as a plaything for a crowd, to a practical, every-day, labor-saving, business machine, has been rapid and wonderful. The transformation will continue and it is not for us to say that the time will not soon come when, as we speak our thoughts to the Phonograph they will not only be recorded for instant or future reproduction, but will, if such is the desire, be spelled and printed out "*ed literatum.*"

The last word of modern science on the existing condition of our earth's center seems to be just this: our planet consists of a cool and fairly solid, but lighter crust, poised upon the top of a very rigid hard, and immensely hot core, which would be liquid and molten, but for the unspeakable pressure of the thick crust piled above it.—*Grant Allen* in May *Chautauquan.*

Exchanges and Reviews.

Webster's International Dictionary. The Authentic Unabridged revised and enlarged. Springfield, Mass. Published by G. & C. MERRIAM & CO., 1891.

Genuine merit is seldom effected for any great length of time, at least by dishonest competitors. The publishers of Webster's Dictionaries had recently to contend with a so-called reprint of Webster's Unabridged. The book in question being a poor copy of the Unabridged as it appeared some forty years ago, came poorly printed with poor type on poorer paper and an inferior cloth binding. It is quite probable that a large majority of these shoddy dictionaries have already fallen where they belong—in the waste-basket—and that the International has had a larger sale in consequence of the comparison. The first impression on examining the new International is, what a beautiful specimen of typographical and book making art, and the closest scrutiny does not alter the first impressions, though it discloses much that is interesting concerning the manner in which this great book has been prepared. It is to be known as the "Revision of 1890" and is not by any means *comp de main* having been in the hands of a large *corps* of painstaking specialists for more than ten years. It "embodies substantially the amplifiction and enrichment of the language * * as has been noted by a wide and close scrutiny." Considerable prominence being given "definitions and illustrations of scientific, technological and zoological terms," students, teachers and the scientific world generally will find the "International" far superior to anything of the kind ever before published. "Webster's International" is a comprehensive popular dictionary which will retain the preeminence so long held by the Unabridged. The ripest results of modern philology are here embodied. It is a dictionary which will meet the

every day needs of all who write or speak the English language. It fully represents the vast and various advances in all departments of thought and knowledge of recent years.

The Standard Directory Containing the names and addresses of the principal Ornithologists, Oologists and Taxiderments of North America. Compiled by WILL A. CROOKS, Bulletin Printing Co., Gilman, Ills.

"A Literary Sensation."

"Since the departure of Amelie Rives-Chanler from this country almost immediately after her marriage, we have had only brief newspaper paragraphs concerning her life and literary intentions. It is now nearly three years since anything of importance has appeared from her pen. Since the daily papers announced that Mrs. Rives-Chanler was hard at work upon a new novel destined to arouse the entire literary world by its artistic merit and bold originality, there have been many conjectures advanced as to the probable source through which the new novel would be given to the public. While many rumors were afloat, the *Cosmopolitan* Magazine had quietly secured it and placed it in the hands of a famous artist in Paris for illustration. The first chapters will appear in the August number of the *Cosmopolitan*. In the estimation of critics who are most competent to judge, this last story will be the most finished, as well as interesting, product of this versatile Southern pen. The story is likely to be the literary sensation of the year. Its publication in the *Cosmopolitan* is a guarantee that it will contain nothing of the kind that excited criticism in Amelie Rives' earlier productions."

What philanthropic impulses prompted the publishers of *Cosmopolitan* to place before the public such a large, finely printed and illustrated magazine, full of the choicest literature, at so low a price, we can not tell, but certain it is *Cosmopolitan* costs but $2.40 per year.

If you have never seen this magazine secure a free sample copy by addressing its publishers at Madison Square, N. Y. City, then send your subscription to us and secure THE SCIENTIST free. *Renewals* to *Cosmopolitan* or SCIENTIST must remit $2 65. Address Ed. SCIENTIST, Kansas City, Mo.

We have received an advance copy of "A list of Molluscar and other forms of marine life, collected in the year 1889 and 1890, in Japan," by Frederick Stearns, of Detroit, Mich. The list embraces 72 named species not found in Duncard; 32 species remain undetermined, many of which will probably be found to be new to science. The shells were sent to Prof. H. A. Pilsbury of Philadelphia for comparison and determination, who regards the collection as a very valuable one.

Worms.

One of the most valuable works of Mr. Darwin was on Worms. Probably he was among the first that drew the world's attention to their immense service. In a certain district in West Africa earth worms are astonishingly abundant, and the richness of the soil is largely attributed to their work. It has been estimated that within the radius of a single square mile, not less than 62,223 tons of subsoil are brought to the surface by them annually, and that within a period of twenty-seven years they will bring to the surface all the soil for a depth of two feet. This is one of the progresses of nature's God for the recovery of the strength of the soil. His servants are found in all forms of His creation, and he adapts all the forms of life to labor, and assigns them to their work.—*Ex.*

Government's Expedition to Death Valley.

Death Valley is a narrow strip of burning salt and alkali crust, extending north and south between two precipitous walls of mountains, the Amargosa and Panamint ranges. Those who have visited it say that it is beyond human powers of description to picture the wholly unnatural scene to be beheld there—the vast stretches of white plain veriegated with black lava, the alluring mirages, the strange appearance of the towering hills outlined like the backbones of monstrous beasts against the yellow sky, the total absence of trees, the dearth of animal life, and the intense heat, from which there is no escape. Here and there, too, are pebble beds miles in extent, made of agate, moss-agate, chalcedony, jasper and obsidian.

THIS ASTONISHING DESERT,

however, is by no means so devoid of life as its aspect by daylight would lead the obverver to imagine. As soon as night falls it is all aswarm with creatures of various sorts. Countless lizards come out of the burrows to look for insect prey, snakes wriggle across the alkali crust; horned toads creep about; and scorpions and tarantulas of enormous size sharpen their claws for combat. Rats, mice and squirrels trot about in active pursuit of game, and wildcats and coyotes forsake their lairs on the mountain sides and roam over the plain in pursuit of all sorts of smaller animals. It is a nocturnal population, simply because the heat is so great as to forbid going out in the daytime.

The Government has recently sent an expedition to this dismal hole and large consignments of dead creatures illustrating what it has thus far accomplished in the study of the life of that amazing region have reached the Department of Agriculture at Washington. The collections thus far received here include 2368 mammals, besides numerous birds, reptiles, insects and other specimens. It is desired by the scientific authorities in charge to find out just what animal and vegetable life is able to preserve existence under conditions so extraordinarily unfavorable as are found in this desert of horror, the like of which is not found anywhere else in the world.

The Death Valley expedition has not attempted to encamp upon the desert itself for the sake of securing specimens. It has been obliged to content itself with pitching tents about the edge, at the feet of the mountains, making brief expeditions across the torrid plain, setting traps, and returning as quickly as possible. By this method the traps could be emptied and set again without much loss of time. This is of consequence in Death Valley, where a man requires two gallons of water daily to keep him from dying of thirst, and even then is a sufferer. Little traps of very simple and most admirable pattern are employed for catching the small mammals. Two or three dozen of them can be conveniently carried in the pockets of one's coat, and the game coveted can enter from any side. Each one is hardly more than a wire spring, ingeniously contrived, so that the quadrupedal victim is not obliged to enter a hole, sees no danger, and does not dream of peril until he is caught. Corn meal is employed for bait and is found most fetching. For the large mammals the gun must be brought into requisition, while the reptiles, unusually slow of movement, are readily gathered in. Of birds there are very few in the neighborhood of Death Valley, though the raven, that funeral fowl, is very plentiful in the woods that skirt its edge, crying with mournful notes for the many travelers whose dried corpses are scattered over the burning level.

As before stated nearly all of the creatures found in this valley are nocturnal in their habits, because they are not able to venture out in the daytime on account of the great heat. Among them are three species of ground squirrels, which live in burrows and feed at night upon roots, leaves and seeds of plants. One of them often climbs the stalks for the purpose of getting at the seeds. At other

times it stands on its hind feet, clasps the stems with its forepaws, and bites off the seed pods, distending its cheek-pouches enormously with the food. One fellow shot by Dr. Marriam, chief of the expedition, had thirty-nine unbroken seed pods in his pouches.

ANOTHER MOST INTERESTING ANIMAL

that inhabits Death Valley is the "kangaroo rat," which makes its way about by jumping. It has long and powerful hind legs and a surprisingly long tail. Its coloring varies from light gray to dark brown, according to whether it frequents the alkali or the lava, nature intending to protect it from capture by the likeness of its hue to its surroundings. The kangaroo rat lives in burrows, as does likewise a smaller kind that is commonly called the "kangaroo mouse." But neither is in any true sense a mouse or a rat; they belong to families quite different.

Nevertheless, there are plenty of real rats in Death Valley, as the expedition has found. One kind, that lives in the chapparal, with bare tails and exquisite soft fur, is the staple food of the Digger Indians who dwell in the mountains thereabout. The latter catch the beasts with dogs, frightening them out of their nests, which is made like those of squirrels, of great size, in the bushes or bunches of cactus.

With respect to the kangaroo rats, one extraordinary point should be mentioned, relating to a certain development of their skulls, which bulge out at the side in a surprising way. In fact, no such big bulges as these, which contain the hearing apparatus, are to be found in any other known animals.

One of the most curious sorts of rodents common in Death Valley is the "scorpion mouse," which lives almost wholly upon scorpions. By the "instinct" which means experince inherited through generations, it has learned which end to tackle its prey by.

Only fifty miles west from Death Valley, which is 150 feet below the sea level, Mount Whitney, the highest mountain in North America, uplifts its mighty peak, covered with perpetual snow, three miles into the air. Thus, within a day's journey of each other, the lowest and highest points on this continent are found. Dr. Merriam wrote the other day that he had breakfasted on twenty feet of snow and was composing his letter to Secretary Rusk at 4 p. m in an altitude of rather less than nothing and a temperature of 110 degrees Fahrenheit in the shade.

In the region described is to be found a most astonishing opportunity for the observation of a traveler, inasmuch as within fifty miles he can

PASS THROUGH ALL THE LIFE ZONES

of the earth, from the hottest tropic to the frozen Arctic, and view not only the vegetation but the beasts and birds of the various climes traversed.

It seems very strange to find upon the summits of Mount Whitney, the San Francisco mountain, and other peaks scattered over the warmer parts of the earth, small colonies of veritable Arctic life, both vegetable and animal. But this is explained when it is realized that during a period immediately preceding the present and known as the "glacial age" the entire northern part of the world was buried in ice, the icecap, which in places was several thousand feet in thickness, extending southward as far as Philadelphia and below Chicago. When this vast cosmic glacier receeded, many Arctic plants and creatures were stranded on lofty mountains, where at sufficiently lofty altitudes the temperature never becomes too high for the continuance of their existence. For an example, the San Francisco mountain in Arizona is an extinct volcano, inhabited by plants and animals which could not possibly have reached it since the glasical period. Though an isolated peak rising out at a vast and burning desert, its snowy top is a veritable Arctic colony.—*Extract from Washington Correspondance Daily Tribune.*

A scientist says: "The chemist will dominate coming inventions. All our fuel will presently be furnished in the form of gas. In a quarter of a century more we shall wonder why man was ever such a fool as to carry coal into the house and burn it."

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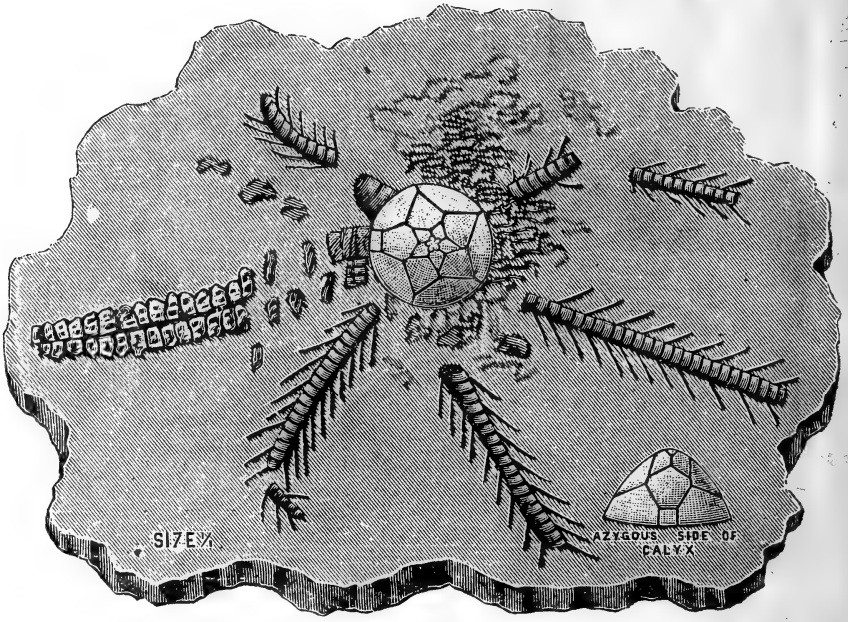
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Official Organ of the Kansas City Academy of Science.

VOL. V. KANSAS CITY, MO., JULY, 1891. NO. 7

FORMERLY

THE NATURALIST.

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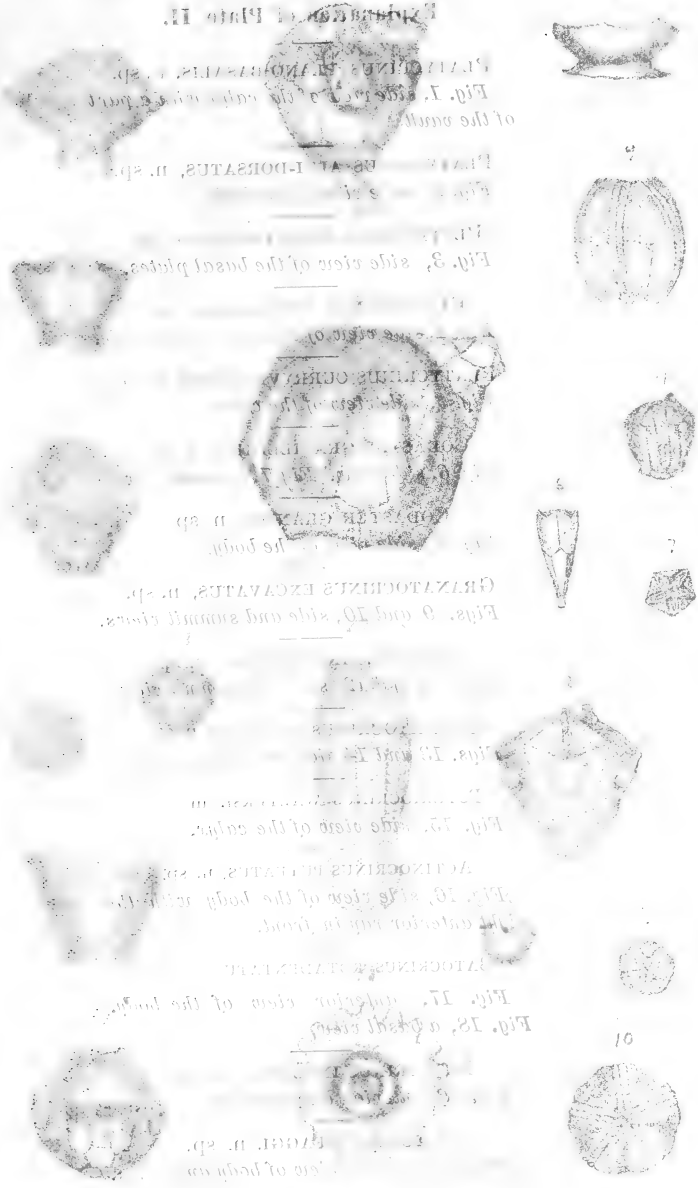


R. R. Rowley, del.

SOME NEW SPECIES OF BLASTOIDEA AND ECHINODERMATA,

FROM THE SUB-CARBONIFEROUS OF CALHOUN AND PIKE COUNTY, MISSOURI,

By R. R. ROWLEY AND WM. F. HARE.

Explanation of Plate II.

PLATYCRINUS PLANO-BASALIS, n. sp.
Fig. 1, side view of the calyx with a part of the vault.

PLATYCRINUS ALTI-DORSATUS, n. sp.
Fig. 2, side view of the body.

PLATYCRINUS MARGINATUS, n. sp.
Fig. 3, side view of the basal plates.

PLATYCRINUS INSOLENS, n. sp.
Fig. 4, side view of the calyx. Anal side.

PLATYCRINUS CURRYVILLENSIS, n. sp.
Fig. 5, side view of the calyx.

CODASTER GRACILLIMUS, n. sp.
Fig. 6, side view. Fig. 7, summit view.

CODASTER GRANDIS, n. sp.
Fig. 8, side view of the body.

GRANATOCRINUS EXCAVATUS, n. sp.
Figs. 9 and 10, side and summit views.

CODONITES INOPINATUS, n. sp.
Figs. 11 and 12, side and summit views.

GRANATOCRINUS EXIGUUS, n. sp.
Figs. 13 and 14 side and summit views.

POTERIOCRINUS WALTERSI, m. sp
Fig. 15, side view of the calyx.

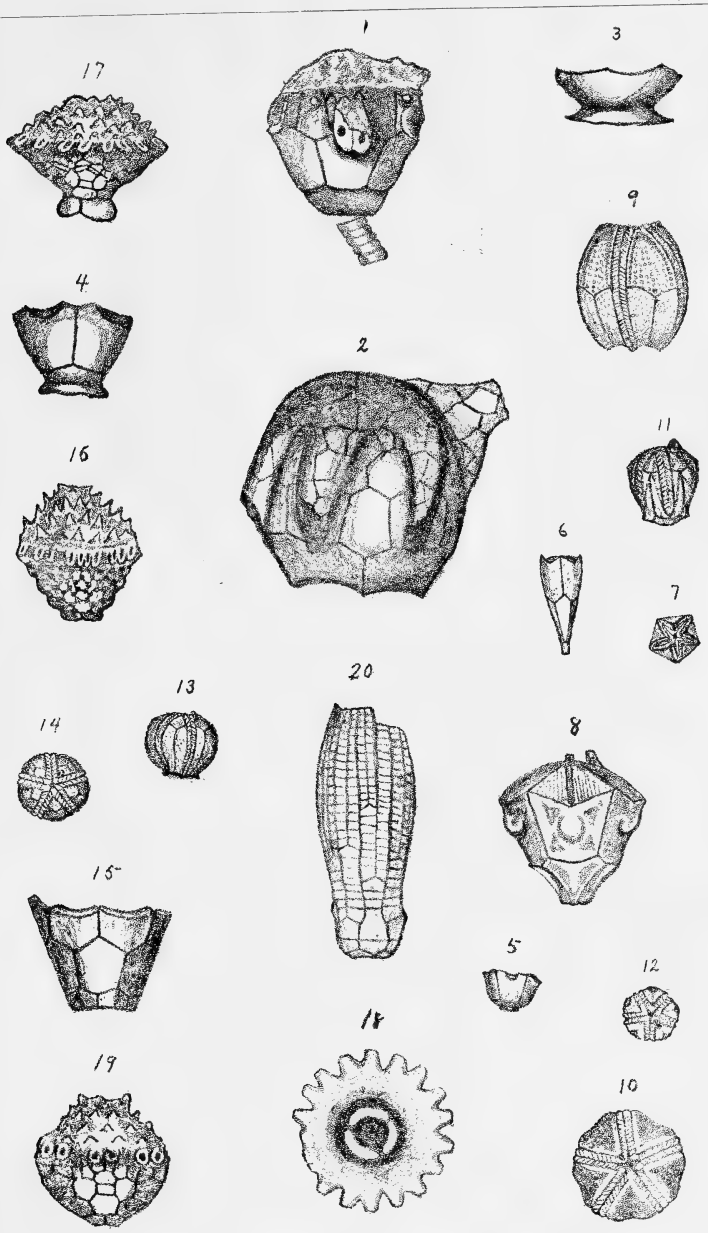
ACTINOCRINUS PUTEATUS, n. sp.
Fig. 16, side view of the body with the right anterior ray in front.

BATOCRINUS ROTADENTATUS, n. sp.
Fig. 17, anterior view of the body. Fig. 18, a basal view.

BATOCRINUS INFLATUS, n. sp.
Fig. 19, anterior lateral view.

ZEACRINUS FAGGI, n. sp.
Fig. 20, anterior view of body and arms.

—Figures all of natural size.—



R.R. Rowley, Del.

SOME NEW SPECIES OF ECHINODERMATA,

FROM THE SUB CARBONIFEROUS ROCKS OF PIKE COUNTY, MISSOURI,

BY R. R. ROWLEY AND SID. J. HARE.

THE KANSAS CITY
SCIENTIST
ASTRONOMY GEOLOGY PHILOSOPHY MINERALOGY BOTANY METEOROLOGY ARCHÆOLOGY ZOOLOGY MECHANICS

Official Organ of the Kansas City Academy of Science.

VOL. V. KANSAS CITY, MO., JULY, 1891. NO. 7

Proceedings Kansas City Academy of Science, June 16, 1891.

Description of some new Species of Echinodermata from the Sub-carboniferous Rocks of Pike County, Mo.

By R. R. Rowley and Sid. J. Hare.

The fossils herein figured and described with one exception, were collected by Mr. R. R. Rowley in the Chouteau and Burlington groups and the type specimens are in his collection. All of the Lower Burlington species are from the quarries and ravines on the hill in the western part of the city of Louisiana; the Upper Burlington forms from the vicinities of both Louisiana and Curryville, while the two Chouteau species were collected along the prairie brooks east of Curryville.

Platycrinus plano-basalis, n. sp.

Plate II. Fig. 1, side view of the calyx with a part of the vault.

Calyx, pail-shaped, sub-pentagonal; width at the top a little greater than the depth. Bottom, rather broad and flat. Plates thick: sutures beveled: surface apparently smooth. Basals form a circular plate of moderate thickness, separated from the first radials by the beveled sutures but not forming any distinct rim. Radials having the width and length about equal. The beveled sutures give a curved aspect to the radials which are protuberant at the articulating facets for the second radials. Facets, about half the width of the plates, semicircular and slightly directed outward. Second radials, observed in one ray, thick and showing two openings. The central of the three interradial plates in each area is the largest and bears a spine-like node above. Vault, depressed, convex; plates, with small spine-like nodes. As the specimen examined is partly imbedded in limestone, the azygous side has not been observed. A few joints of a round column rest against the base, but not attached, and doubtless belong to the specimen.

Collected in the Upper Burlington Limestone on Spencer Creek, two miles north of Curryville, Mo. The illustrated specimen is the only one found.

Platycrinus alti-dorsatus, n. sp.

Plate II. Fig. 2, side view of the body.

General form, sub-spherical. Base, pentagonal, deeply concave and not

visible on a side view. Radials, nearly twice as wide as high, bent inward below and rapidly expanding above, giving a very shallow calyx. Interradial plates, three, the central largest and hexagonal. Central anal plate, large, heptagonal, succeeded by a middle octagonal and two lateral heptagonal plates above. Vault, hemispherical, covered by large hexagonal and heptagonal plates.

As the specimen described is a natural cast, the large furrows, converging from the arm openings, appear as prominent flattened ridges. The anal opening is at the end of a protuberance, directed outward, large, and on a line with the top of the vault.

The specimen inverted looks not unlike a hand grasping an apple, the radiating ridges answering to the fingers, while the anal protuberance is the wrist. This resemblance is not so fanciful.

The plate sutures are very distinct throughout the whole body.

Columnar attachment moderately large, circular.

Of this large and striking fossil but two natural casts have been found in the the Upper Burlington chert at Louisiana, Mo., the specimen figured having been collected a number of years ago by Mr. E. J. Haffner, now of Muncie, Ind.

PLATYCRINUS MARGINATUS, n. sp.

Plate II. Fig. 3, side view of the basal plates.

The base of this peculiar Platycrinus is all that is known of the species, but the very extravagant, thin, rim-like expansion about the columnar attachment is so striking as to lead us to found a species upon material we would otherwise consider insufficient. The Basal plates form a low, convex cup, without surface ornamentation. The expansion is extravagantly produced and very thin and fragile, indistinctly fluted and furrowed on the underside.

Columnar attachment rather small and round. Columnar canal comparatively large.

The specimen figured was found in the Upper Burlington Limestone on Spencer creek, two miles north of Curryville, Pike County, Mo.

PLATYCRINUS INSOLENS, n. sp.

Plate II. Fig. 4, side view of the calyx. Anal side.

Calyx, cup-shaped, slightly broader than deep. Plates, moderately thick; sutures, slightly beveled; surface, without ornamentation. Basals produced into an expanded rim below and without columnar excavation, sloping upward to meet the first radials; the latter being slightly convex and about as wide as long. The articulating facets for the second radials, a little more than half the width of the upper edges of the first radials, beautifully striate. Column medium in size and round at its attachment to the base.

The basal rim is fluted below and crumpled at the edge.

Collected in the Chouteau Limestone, three miles south-east of Curryville, Mo.

PLATYCRINUS CURRYVILLENSIS, n. sp.

Plate II. Fig. 5, side view of the calyx.

Calyx, bowl-haped; width, nearly one and a half times the height. No noticeable beveling at the sutures. Surface, apparently smooth. Basals but slightly convex with a depressed rounded rim about the column base. Radials but little wider than high, expanding but little upward and prominent at the articulating facets which occupy less than one-half the width of the radials, Columnar attachment small.

Collected in the Chouteau Limestone, three miles east of Curryville, Mo. The

specimen illustrated was the only one found.

CODASTER GRACILLIMUS, n. sp.

Plate II. Fig. 6, side view. Fig. 7, summit view.

Calyx, elongate-pyramidal; base, pointed; summit, excavated along the rays; the ambulacra separated by interradial processes; a summit view gives a pentagonal outline at the outer ends of the ambulacra. Basal plates form a slender cup, in length less than the radials. Radial plates long and arched, with limbs projecting a little beyond the summit; no depression at the anal interradius. Sinuses rather wide and deep, with steep sloping sides. The ambulacra do not occupy the entire length of the sinuses, the right and left anterior rays being broadest and sub-petaloid, while the remaining three are elongate-triangular. Lancet plate not visible. Side plates cannot be well made out. The ambulacra are very convex, standing up as ridges. Hydrospire slits fine, crowded. Central opening not closed in the two specimens discovered. Anal opening apparently triangular. Surface ornamented by distinct straight lines parallel to the edges of the plates. A basal view of this fossil gives a triangular outline. The columnar scar is round, occupying nearly the entire bottom of the base. Hydrospire slits in ten groups.

Collected in the soft cherts of the Lower Burlington Limestone at Louisiana, Mo. From the fact that this specimen was collected in the cherts, may lead some one to think the specimens are casts, but they *are not.*

CODASTER GRANDIS, n. sp.

Plate II. Fig. 8, side view of the body.

This species is described from a beautifully preserved natural cast. Calyx above the basal plates, an inverted frustum of a pyramid, strongly pentagonal. Two of the basal plates pentagonal and large, while the third is smaller and quadrangular; just inside of the angles below, there is on each plate, a strong prominence which would give to a specimen preserving the test, a strong trilobate outline to the base. Radial plates longer than wide with a prominent central node; the limbs not as high as the top of the vault. Oral ridges prominent. A sub-ambulacral duct or canal is represented by a strong rod on the cast. Of the ambulacra themselves nothing can be learned.

There are ten series of hydrospire slits, nine to the series, making ninety in all.

Summit of the body, broad, slightly convex. Central and anal openings prominent. Widest part of the body at the extremities of the radial limbs.

Other features cannot be made out.

The ten sets of hydrospire slits possessed by this species, as well as by *Codaster gracillimus* would seem to place both species under Etheridge and Carpenter's genus *Phœnoschisma*, but externally they have a strong resemblance to *Codaster*, especially *C. grandis*, which forcibly reminds one of the British species *C. trilobatus*.

Collected in the Burlington chert (upper) at Louisiana, Mo.

GRANATOCRINUS EXCAVATUS, n. sp.

Plate II. Figs. 9 and 10, side and summit views.

Body oval; base deeply concave; radial plates abruptly bent inward and upward at the lower extremities of the ambulacral areas, to meet the upper edges of the basal plates; the radials in length equaling half the height of the body and separated by well marked sutures. Between the lower extremities of the ambulacra the surface of the radials becomes concave while it is merely flat

above. Interradial and anal pieces half the height of the body, flat below but becoming concave above and forming slight ridges about the ambulacra. Ambulacra narrow and extending the entire length of the body (down to the basal cavity); side pieces numerous. The ambulacra extend beyond the general surface of the body and on a plane with the ridge-like edges of the interradials and the immediate margins of the radial pieces, giving at the top of the body and the lower ends of the ambulacra a subpentagonal outline with five flat topped ridges. Anal opening round; spiracles small, hardly discernible, eight in number. Surface of interradials covered with longitudinal rows of rather coarse granules while the radials are ornamented by much smaller and crowded ones. The specimen figured was picked up in the gravel at Louisiana, Mo., and, doubtless is from the Burlington Limestone.

GRANATOCRINUS EXIGUUS, n. sp.

Plate II. Figs. 13 and 14 side and summit views.

Body globose, base small and rather deeply concave. Radial pieces nearly equalling the entire length of the body, divided nearly their entire length by the ambulacra. Interradial and anal plates very noticeable as they are flattened and have a different ornamentation from those on the radials. Ambulacra moderately broad, tapering slightly downward, with thirty or more side plates to each half ambulacrum. Between the sides of the interradials, the ambulacra extend as convex ridges above surface of the plates but downward they are hardly as prominent as the slightly raised margins of the radial pieces, either side of them. The lower ends of the ambulacra are received into projecting angles that give the appearance of five little feet, slightly directed outward. Between these projecting points the surface of the radials is concave. A cross section about the middle of the body of the fossil gives almost a circular outline.

The ornamentation of the interradials are fine cross lines, following the direction of the triangular suture or union of the interradials with the radials. The radials are set with small granular prominences, and, beginning with the downward angles of the radio-inter-radial suture, an elongate triangle extends and widens till its basal angles reach the ambulacra just above their extremities below, appearing as a median, slight y raised field. This field is not noticeable on small specimens. Anal opening under a small prominence. Spiracles not observed.

This fossil may possibly be Meek and Worthen's *G. pisum*, but it is from an entirely different horizon, having been collected from the base of the Lower Burlington limestone at Louisiana, Mo.

CODONITES INOPINATUS, n. sp.

Plate II. Figs. 11 and 12, side and summit views.

Body sub-oval; length greater than width, the widest part being near the summit. Base slightly convex, the plates being tumid, giving a tri-node appearance around the base of the column.

Radial plates more than two-thirds the height of the entire body. The interradials meet the radials below in a slightly triangular suture. The anal plate supports at the summit a tri-pointed spine-like projection, overshadowing the anal opening.

Ambulacra rather narrow, widest above and slightly tapering downward, terminating in little pointed projections, directed out horizontally. In length the ambulacra are about seven-eighths of the entire body, with about fifty side pieces to the field. Between the lower extremities of the ambulacra, the radials are

concave. Each ambulacrum appears as a double ridge above the surface. Anal opening large, with a strong projection behind it. The hydrospire slits can not well be made out. In one specimen the central opening and adjoining ends of the ambulacra are arched over with a covering of minute pieces. The interradial and anal pieces have each a central ridge and are ornamented by strong lines parallel with the suture below. Beginning with the radio-interradial suture and extending and spreading downward to the point-like projections of the ambulacra there is in each radial field a lanceolate area strongly marked longitudinally by linear elevations while the radials either side of an ambulacrum are cross-striate, as the interradials above. The linear markings of the lanceolate fields are parallel with the radial sutures. The basal plates are similarly ornamented.

The outline in this fossil is strikingly like a *Granatocrinus* and might be mistaken for *G. neglectus* but the lanceolate areas, strong linear markings and entire absence of granules, widely separate the forms. This species is con-generic with Meek and Worthen's *Codonites gracilis* from which it differs in its smaller size, more oval outline of body, much greater length of ambulacra, longer interradials, much more prominent anal proboscis and in the central ridge of the interradial and anal pieces.

Collected in the Lower Burlington series at Louisiana, Mo. The cabinet contains seven or eight specimens from which the description has been made.

POTERIOCRINUS WALTERSI, n. sp.

Plate II. Fig. 15. side view of the calyx.

Calyx an inverted frustrum of a cone, width a little greater than the length. Under basals large, flattened below with scarcely any basal cavity. Under basals wider than long. Basals large, hexagonal, width and depth about equal. First radials once and a half as wide as long, pentagonal. The shallow sinuses for the reception of the second radials is nearly the entire breadth of the superior edges of the first radials, with a strong sharp ridge, lengthwise of the scar. Anal plate about as large as an under basal, hexagonal, resting on the upper edge of a basal, and between two radials; height and width about equal, extending upward beyond the radials. The basal on the anal side is the largest plate in the body and truncate instead of angled above.

Plates smooth, sutures well defined.

This species resembles Shumard's *P. meekanus*, but is much smaller, longer in in proportion to the width, with less thickness of plates, and with scarcely any concavity below, the bottom being almost flat. But one specimen found, at the very base of the Lower Burlington Limestone at Louisiana, Mo.

Specific name given in honour of Mr. Edwin Walters, of Kansas City, Mo.

ACTINOCRINUS PUTEATUS, n. sp.

Plate II. Fig. 16, side view of the body with the right anterior rays in front.

Calyx inversely bell-shaped. Vault less convex than the calyx. Depth of the entire body equal to its greatest width. Basal plates shallow, slightly projecting as a rim, excavated for the column. First radials a little wider than high, hexagonal. Second radials about half as large as the first radials, width greater than the length, hexagonal. Third radials less than the second radials in size, length and breadth about equal, pentagonal, supporting on their upper sloping edges two hexagonal or heptagonal secondary bifurcating plates. Above each of these are two plates with arm openings, making in all twenty such openings.

The first anal plate is in line with the

first radial, but is about the size of the second radial, hexagonal, supporting two smaller plates above, one hexagonal, and the other heptagonal. There is a row of three smaller anal plates above these, succeeded by two small plates.

First interradial plate hexagonal, about as large as the third radial; width and length equal. The two plates above this, smaller, hexagonal, supporting two elongate plates above. A small uxillary plate has been noticed in several of the rays. Arm openings slightly directed upward. Each plate of the vault bears a strong spine-like node. Anal tube, slender and nearly central.

The division of the arm openings into groups is not noticeable. At each suture the angle around all the calyx plates is a deep pit giving the central part of each plate a strong convex appearance. Radiating from the centers of the larger plates are more or less indistinct ridges.

Type specimens collected at the very base of the Lower Burlington Limestone, at Louisiana, Mo.

BATOCRINUS ROTADENTATUS, n. sp.

Plate II. Fig. 17, anterior view of the body. Fig. 18, a basal view.

Body depressed, wheel shaped. Basal plates form a slightly expanded rim or handle and are deeply excavated below for the columnar attachment. Excavation larger than the column. Perforation very small. The basals are separated laterally by rather deep clefts. First radials hexagonal, once and a half wider than long. Second radials quadrangular and nearly twice as broad as long. Third radials pentagonal, wider than long and supporting above on upper sloping edges two pentagonal plates, twice as wide as long. Each of these in turn supports a secondary bifurcating plate. A succeeding series of one or two higher radials to the arm openings. Of the three interradial plates the lowest is more than half as large as the first radials; width a little greater than the length, ten sided, supporting above two very small five sided plates. Of the seven anal plates the lowest is hexagonal and quite as large as the first radials, supporting three plates above, of which the middle one is about as large as the largest interradial plate, and ten sided; the lateral ones are small and hexagonal and one of these latter supports above a small pentagonal plate. The highest plates in the anal field are two wedge shaped small pieces, hardly breaking the ring formed by the higher radials. Proboscis or anal tube nearly central, not stout.

Calyx plates smooth, with little perceptible convexity. Plates of the dome nodose, strongly.

Arm openings, eighteen in number and directed upward, each arm bearing plate forming a strong lateral tooth, giving to the fossil in a basal or top view, a circular-saw appearance.

Collected in the Lower Burlington Limestone at Louisiana, Mo.

BATOCRINUS INFLATUS. n. sp.

Plate II Fig 19, anterior lateral view.

Body sub-globose. Calyx inflated. Vault convex, but low. Basal plates pentagonal and nearly twice as wide as high. First radial plates large, a little wider than long, hexagonal. Second radials, quadrangular, once and a half as wide as deep. Third radials more than half as large as first radials and one and a half times as wide as long, seven sided, supporting above two series of two pieces each to the arm openings. The first radials of the right and left posterior rays are seven sided. The interradial plates number five to each space, the lowest and largest being eight sided and about two thirds the size of a first radial. Above this plate and resting upon it are two elongate pieces, the one five and the other six sided, longer than wide. Above

are two other plates extending upward between the arm openings, thus separating the arms into series. The first anal plate is five sided and but little more than half as large as the first radials. Above this and resting upon it is a larger plate seven sided. To the right and left of these latter are two rather large, seven sided pieces, while above there are two smaller plates, to the left of one of which is still another small piece. All of these anal plates are about as wide as long. There are fourteen arm openings, rather large, round, and directed outward, the arm bearing plates being scarcely protruberant. The plates of the vault are nodose. Column rather strong, sub-central. All of the plates appear thick. Basal plates excavated for the reception of the column. Plates of the calyx smooth with scarcely any convexity.

The type specimen was found at the very base of the Lower Burlington Limestone at Louisiana, Pike County, Mo.

ZEACRINUS FAGGI. n. sp.

Plate II. Fig 20, anterior view of body and arms.

Calyx low, cup-shaped. Base concave. Under basals hidden by the upper stem joint. Basal concavity but little larger than the stem. Basals five in number, pentagonal, width and depth about equal. First radials pentagonal, once and a half as wide as long and supporting above on their longest sides the second radials, four of which latter are pentagonal and but little wider than long, while the anterior one is hexagonal, truncate above and fully as long as wide. On the upper sloping sides of the second radials of the four rays, occurs thr first bifurcation. On the second limb of the right posterior ray, the second bifurcation occurs on the eighth joint above the first bifurcating plate. Of the right anterior ray the first limb bifurcates on the sixth, while the second does so on the eighth joint. On the left anterior ray both limbs give their second bifurcation on the sixth piece above the second radial. The greater part of the left posterior ray, and the first limb of the right posterior ray, as well as the entire anal side, of the specimen is hidden by the surrounding matrix.

The anterior ray gives the first bifurcation on the fifth primary radial, the second division remaining simple above, while the first has its second bifurcation on the ninth joint above the first axillary plate. The arms are simple above the second bifurcations in all the rays. If both limbs of the left and the first limb of the right posterior rays bifurcate, as seems certain, there are nineteen free arms. The axilliary plates slightly node like. Arms almost entire and closely fitting, laterally so as to hide the ventral tube and pinules. Surface without ornamentation. Compared with *Z. troostanus* our species is less robust, with equal (except in the anterior ray) instead of odd bifurcation of the rays, and with less number of free arms.

The collection contains but one specimen found in the *Schizoblastus sayi* horizon of the Upper Burlington Limestone on Spencer Creek, two miles north of Curryville, Mo.

Specific name given in honor of Judge T. J. C. Fagg, of Louisiana, Mo., to whom one of the authors is under many obligations for favors and encouragement.

SEVERAL of the members of the Kansas City Academy spent the 4th at the Lansing, Kan. coal shaft and were well repaid in fossil ferns. Many of them being a bright green color and looking more like living than fossil ferns. Mr. S. J. Hare of the Academy has a few of these ferns for exchange.

Proceedings Kansas City Academy of Science, Feb. 24, 1891.

Notes on Archæology.

By Edwin Walters.

There is a wrong impression regarding so-called arrow heads. Many of these that are two or three inches long are called "arrow heads." One inch and a quarter in length is the limit for arrow heads. They are usually less than one inch. The longer implements of similar shape were spear heads or knives. The "war points," or arrow heads used in war by modern Indians are very small. They are usually from one-half to three-fourths of an inch in length, and are flaked at right angles to the axis. This makes the resisting surfaces corregated. The parallel sinuses between the anticlinal folds make receptacals for poison which cannot all be brushed off by the arrow passing through clothing. If the arrow heads were smooth, the poison might fail to be introduced into the blood of the victim.

I have known persons to live several years after being wounded by a poisoned arrow. So-ko-nut, son of Keokuk, a Sac chief, was wounded by a Comanche's poisoned arrow in 1869. The wound was a flesh one on the inside of the fibia. He showed it to me either in 1872 or 1873. It did not cover an area of more than three square inches. Later, the virus reached the inner walls of the femur artery and was rapidly disceminated through the body causing death in a few days. If I remember correctly, he died in 1875 — six years after receiving the wound.

It might not be out of place here to add a description of the poison used by our modern Indians. There are probably many kinds in use among the various tribes. I have lived much of my life among the Osages, Kaws, Sacs and Foxes and other south western tribes. I have never seen the poison prepared, but different Osages have given me the following:

A piece of liver is fastened to a stick, and held to a rattle-snake which is allowed to bite the liver a number of times. The snake virus causes rapid decomposition. The material is next tied up in the shells of mussels or clams — care being taken to fit the shells neatly together to prevent any of the material — poison — escaping from between the joints or hinge lines of the shells. These shells, with their deadly contents, are carried to the battle field and opened, when the points of the arrows are dipped into the material and are ready for use. A squaw usual y carries the poison to the battle-field. It is probable that the prehistoric races were not very different from the modern Indians in their uses of stone implements.

Our illustration shows the outline of an implement that seems to be but little understood. It is usually about twice as large as shown in the diagram. It has rece ved various names from different writers. I think it was used as the ensignia of a gen—possibly of a tribe. I have seen Indian chiefs carrying spears, one end of which contained the spear head and the other some rudely shaped article that the casual observer would think was an attempt at ornamentation. But these articles were ensignias of gens, or bands, and could only be carri d by chiefs of rank. I think the article represented by the figure was used as such an insignia. It seems to have been an attempt to represent a trident. Those who have read my published article on the "Prehistoric Battle" will remember that I called attention to the pictured rocks in eastern Kansas. In scores of places can be seen figures on the rocks that undoubtedly represent the sea-god, Pseidon or Neptune, with a trident in his hand. The Pueblos

have a written history which they claim reaches back over 9300 years. This history claims that the Pueblos descended from a sea-faring people, who came on this continent from the south-east. It will be remembered that about twelve years ago Lieut. Frank Cushing took a band of Pueblos east and they were at Plymouth, Mass., on "Forefather's Day." The visiting Pueblos improved the opportunity by performing a religious ceremony that can only be performed at the sea-shore. They claim that their tribe was driven inland by a warlike race and that they had not had an opportunity of observing the rites and performing the sea-shore ceremony for about 7000 years. They took a keg of sea-water home with them to perform another religious ceremony. I rode on the train with them from Emporia to Topeka. They and Lieut. Cushing occupied a car to themselves a portion of the way, and were rehearsing the seaside ceremony. They claimed to have explicit directions for the ceremony in the sacred books of the Pueblos.

Most of the Mexican tribes have traditions that point to a sea-faring origin. I have sometimes thought that these traditions are due to the antithetic faculties of the human mind. All people, according to their traditions, have passed through a golden age, when the environments were just the opposite of those of the present.

The habit of disparaging the present is almost universal. The people of the foggy north-east dream of a dry, sunshiney land, the opposite of their own. It is perfectly natural for the tribes that inhabit the dry, desert plains of the south-west to dream of a moist, oceanic climate — of green hills, pleasant islands and cool beaches. Yet there seems to be some justice in the claim of these Pueblo tribes that they decended from a sea faring race. I showed an intelligent looking Zuni, who belonged to the priesthood of the tribe, one of these trident shaped articles. He said "*El Rey*, senor." "The King, sir." I then made a drawing of the object so common on the shelving rocks of Kansas, described above. He looked at it and said "*El Dio del agua*, senor." "The god of the water, sir." It would seem from all the observations that I have made on this subject that the trident is an emblem of authority, or an insignia of rank, and that many inland tribes have traditions of the sea and the sea-god, Neptune.

If I am correct, these trident-shaped articles are very important and useful in ethnological investigations.

The manner or method employed by the prehistoric races to flake their flint, chert, or other stone implements has been widely discussed. Cushing made some important discoveries among the Pueblos, but the subject may still be considered an open question.

An old trapper who was once in the employ of the American Fur Company in the north-west told me that the following is the finishing process:

Put the arrow head or implement to be finished in boiling, suet, grease. After a short time has been given the material to temper, bring one surface of the material above the upper surface of the grease. Now, take a straw, splint or something of like form and nature, and dip it into cold water. Draw the wet end of the straw along the exposed surface of the material in the hot grease, and immediately a flake, the exact size and shape of the moistened area will be thrown off.

So far as tried by two or three friends to whom I made the suggestion, the experiments at finishing flints after this method have been a failure. Notwithstanding this, I am still inclined to this theory, and would for others to experiment.

PROF. JAMES HALL, State Geologist of New York, is making another western trip through Indiana, Illinois, Iowa, Michigan and Wisconsin, in persuit of more fossils to be used in completing the second part of his work on Brachiopoda. This work will be of great interest to palæontologists. Prof. Hall should receive the desired aid from our western collectors.

Proceedings of the Kansas City Academy of Science, June 30th, 1891.

Something about Bacteria.

By Joseph Sharp, M. D.

So much has been said about Micro-organisms as the cause of disease that we are prone to think of them only in that connection. Yet this is the very smallest part played by bacteria in nature. Wherever complex chemical compounds (especially organic.) are being torn apart, they are present. Wherever we have fermentation or decay, it occurs through the agency of these little bodies.

It is this phase of the question upon which I will address you this evening or something of the natural history of these minute unicelular organisms and their part in the life Cycle.

They are minute vegetable cells very small, but because such is the case, we are not to presume that we can know nothing about them.

To give an idea of their size, I present this diagram, representing ten thousand times the diameter of one of the globular forms.

No. 1.

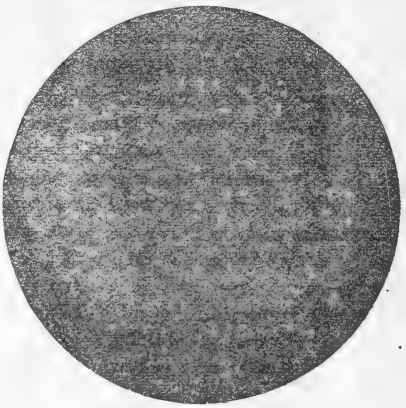
1 centimeter, 10,000 times the diameter of micrococcus.

The most useful powers in observation of these organisms under the microscope, are those amplifying from 500 to 1000 times, so that as actually seen, they appear from 1-10 to 1-20 of the size here represented. They range from .5 micromillimeters to 5. micromillimeters in diameter This diagram represents 10,000 times these dimensions.

No. 2.

10,000 times .5 microns the diameter of the smaller Bacteria.

From 11,000 to 44,000 of these minute bodies could lie side by side in the space of an inch. Miller estimates the Bacteria present in a foul mouth at 1100 millions, or about 18 times the present population of the United States.*



No. 3.

10,000 times 5. microns the diameter of the larger Bacteria.

The diameter of a red blood corpuscle of man is about 8 microns so that a number of bacteria might find an abiding place in one of these cells and they can pass freely through the interstices of the tissue cells.

Sir William Thompson estimated the diameter of a molecule at about 1-50,000,000 of an inch, (.00005 microns,) so that every one of the minute organisms are an aggregation of many thousands of the most complex molecules. To those who feel skeptical as to the possibility of such estimates being any better than wild guesses, it is only necessary to cite the making of test plates for the resolving power of microscopes having 440 to 8930 (11,000 to 224,000 to inch) lines to the Millimeter ruled on glass.

The limit of microscopic vision for the most useful objective is the resolution of about 120,000 lines to the inch.

The study of bacteriology then, is like studying the natural history of a valley from a neighboring mountain top; only when the elements are in the most favorable condition will we see anything, and then at first only a spot in the landscape, but as we look and look, we begin to distinguish general differ-

* W. D. Miller's Micro-organisms in the Human mouth.

ences. Ah, there is a little stream down the center, and off to the right it forms a little lake. Hi, ho! what was that, that moved on the lake? Then a ray of light breaks through an opening in a passing cloud and for a moment the surface of the lake shows vividly, and we feel sure that we see a flock of ducks. Gradually we make out other objects along the stream, a waterfall over lime-stone rocks; a heron plying his trade along the stream; then we turn our attention to the varigated verdure along the sides of the valley to find here and there clumps of foliage that make us sure of the presence of the favorite food of deer.

There! something moved in that part of the undergrowth, and we exclaim, a deer! a deer! but no, out comes a bird, from the flight of which we recognize a crow. But as we continue our examination, lying partly in the shadow and partly in the sunlight we see a deer. Directly we find ourselves moveing here and there to get favorable light, or peeping through our hands to cut off surr unding objects and to better see special features of the landscape.

Why did we make out the little stream and the lake first in the landscape?

Because of the greater reflecting and refracting power of water.

How did we know the disturbance in the lake was due to a flock of ducks? Did we see a single duck? No, but we saw the surface of the lake suddenly lighted by a ray of sunlight and on it a moving speck, the peculiar outline of which told us that it was made up of a number of units, and from this outline and the relation of the specks to the surface, we felt certain of the ducks.

The sharp outline, marked contrast of light gray and black of the waterfall, and the ragged fragments of rocks below, made us certain it was in a limestone ledge.

From the characteristic motions of the heron, and part of the stream in which he waded, we felt very sure that there was fish in the water. Yet, as acute as we are, we mistake a startled crow for a deer when we look into the spice brush and think of that kind of game. And yet while we looked over that very part of the field repeatedly we did not see the deer, until helped out by the light and shade, contrasts of different parts of the animal.

Now if this were a hunting party viewing this valley we can imagine one would say, that is very hazy seeing ducks on a pond when I can hardly make out a heron a good deal nearer to us; and the retort, it is about as probable as that statement of yours about the "Crane" gawking about catching fish. another says; or that the waterfall is formed in limestone; another says we thought we saw the deer in the spice brush. Then the hunter of the party puts the matter at rest by saying ducks, deer and fish and a good place to camp; here goes, and all follow him towards the valley.

Now this is just what happens when we study microbes under the microscope: we are seeing from about the limit of our vision, and must by the aids of sub-stage condensers, and stops; and by stains, take every advantage of light and shade and difference of refraction to make out objects.

Necessarily great differences will arise between different observers on account of the favorable or unfavorable condition under which the same things are seen, and equally certain it is that anticipation, enthusiasm and bias lead to the finding of things that do not exist.

The most that can be done in this line is to make out and compare forms, as it is not possible, as in viewing the landscape, to move closer.

As a check on this means of investigation we have the appearance of aggregation of these organisms in different media, just as, in a landscape, we would recognize a clump of a certain kind of foliage when we can not see any particular plant.

Further, we know what results are produced in different soils, by the life processes of these organisms.

The living vegetable cells containing chlorophile, in the presence and from the force

derived from sunheat and light, from ammonia, water and carbon, Dioxide, Constract Organic Compounds like, Starch, Sugar and Cellulose and build new cells to be used in the growth of the plant.

Organic forms, as is well known to those of you who have for years been studying fossils, are well nigh indestructible to the gross forces of nature, and there would come a time, if only these forces were at work in the decay of vegetable and animal matter, when the surface of the earth would become over burdened by complex, Chemical Compounds, unsuitable for the nourishment of vegetable life.

These little uni-cellular organisms, some of which require oxygen; others, no free oxygen, are the agents that disrupt and simplify these organic compounds and obliterate vegetable and animal forms.

However, live vegetable and animal cells and even dead ones, have too much resistance to be attatcked by bacteria, until the physical and mechanical forces have made the inroad, thus Pasteur, while he found abundance of ferments in the dust of the grape skin, never found them in the juice of the healthy grape. Then these minute organisms are the chief agents in all retrogression of organic matter and while they have only been known for a short time, our knowledge of them calls for a revision of all hypotheses as the disintregation of all forms of matter.

To an Insect Imbedded in Amber.

By Mary E. Nealy.

Thou art honored much, thou winged thing,
With a coffin of solid jewel:
'Twas a lucky hap that tangled thy wing,
In a trap that seemed so cruel.
For the loss of a brief summer days
Thou hast ages of gilded splendor,
With a shroud of the sunbeams' prisoned rays
To crown thee with light so tender!

And thou shalt gleam in her raven hair —
That proud and beautiful maiden;
Or on her bosom, so snowy fair,
May'st find thy blissful Aidenn.
Or, gleaming out on her arm so white,
Thou may'st shimmer, a star of beauty,
Then be laid aside to rest at night,
And arise to some kindred duty.

The delicate mosses, leaves and stems
In the Amethysts' royal prism;
The veins of gold and precious gems
In the mountains' deep abysm;
Stalactites hanging in darkened caves
That flash like the stars of even,
And the Corals gleaming amid the waves
Like the sunset hues of heaven:

The fossil fishes in solid rocks
That have lain entombed for ages;
And, beneath the Pyramids' mystic blocks,
Those carved, historic pages:
The moonlike Pearl at home in the deep,
In her pure, enameled chamber,
Are like the tears the mermaids weep —
This fragrant, sunlit Amber!

I love the Ruby's rich red glow,
Like roses concentrated;
And I love the Opal's fire and snow —
Its cloud and sunshine mated.
And the Pearl that has caught beneath the sea
Her color from the moonlight;
But I love as well to gaze on thee —
Thou warm, embodied sunlight!

Ah, tiniest insect of a day
Caught in this golden prison;
Free from old time and dark decay,
To what heights art thou arisen!
Up from a few short summer hours
On weed or wall to clamber,
To rest forever in sunlit bowers
In a couch of purest Amber!

O, that this insect life of mine —
This drop in the mighty river,
Could be folded up in as fair a shrine
To rest for aye and forever!
If the soul may rest through the infinite years
In a clasp so pure and tender,
What heart would not this life of tears
Most willingly surrender?

The Scientist.

FORMERLY THE NATURALIST.

Entered at Kansas City, Mo., for transmission through the mails at second class rates.

KANSAS CITY, JULY, 1891.

A Monthly Journal, devoted to all branches of

SCIENCE.

The Academy of Science Pub. Co.,
Publishers and Proprietors,
Kansas City, - - Missouri.
R. B. Trouslot, Editor.
Associates: Joseph Sharp, M. D., E. Butts, David H. Todd and Sid. J. Hare.

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Ed. SCIENTIST, KANSAS CITY. Mo.

No doubt some of the readers of SCIENTIST were interested in a recent article appearing in its columns by Roger Cunningham, entitled "Drawing for Photo-reproduction," which describes the simplest means of preparing good illustrations; so simple that those having no previous experience can make their own cuts, if they can draw at all. The plate in this issue illustrates this simple method. It is Prof. Rowley's first attempt at this kind of work.

To those who cannot draw, you, too, can prepare cuts, by photographing your specimens or objects twice the natural size, with an enlarging camera. Prepare Ross' stipple paper No. 1½ as you would for ordinary blue print work, then print from your negative on the prepared paper, and thus secure an exact drawing of your object. With a Dickson's pencil No. V. S. or S., blacken the blue print just as shaded in blue. As blue is not reproduced in making the plates it is necessary to see that all the blue print is covered. The object in making the drawing twice the actual diameter is to give a better chance to illustrate details in small objects. When the object is large as a house, use No. 1½ paper as for all other drawings, making the drawing twice the dimensions of the desired cut. In etching, it is reduced one-half the size of the drawing, thus making the cut of the desired size.

Should any of our readers desire to try this work, and will make their wishes known to us, we will give a full description of the process of making theblue print liquid, preparing the paper, etc., in another issue.

S. J. H.

PROF. G. C. BROADHEAD of the State University spent a day in Kansas City recently looking over the several collections, his special object being to secure some specimens of the newly discovered Crinoids and Foot-prints with which the readers of SCIENTIST are familliar.

Exchanges and Reviews.

Key to North American Birds. Revised Edition. By Elliott Couse, A. M., M. D., PH. D., etc., etc. Over 900 pages. Nearly 600 illustrations, one full page colored frontispiece. Cloth, post paid,.....$7 50. University Press: Cambridge, Boston: Estes and Lauriat.

Our limited space will permit only the briefest mention of this excellent work. It is a monument that will resist the destructive greed of Father Time, centuries after all memory of the author has passed away. Dr. Coues says, "It is well to do great things, but better still to be great. After carefully reading the "Key" it will be evident to every one that the doctor has achieved greatness.

In his "Historical Preface" we find a history of American Ornithology, condensed and boiled down from its chaotic beginning during the sixteenth and seventeenth centuries which he calls the Archaic Period, through the "Pre-Linnæan" and "Post-Linnæan" Epochs of the eighteenth century to the "Vieillotian Period" of 1800-1808 when comes the "Wilsonian Period" which in turn is followed in rapid succession by the "Bonapartian Period," the Swainsonian-Richardsonian Period," the "Nuttallian Period" and the eventfull "Audubonian Period." This brings us to about the middle of the nineteenth century where for five years we find the "Cassinian Period." Beginning with 1868 he describes the "Bairdian period," closing with: "But here I pause. My little sketch is brought upon the threshold of contemporaneous history,—to the beginning of the Bairdian period, of the close of which as of the duration of the Bairdian epoch, it is not for me to speak. When the splendid achievements of Americans ornithologists during the past quarter of a century shall be seen in historical perspective; when the brilliant possibilities of our near future shall have become the realizations of a past; when the glowing names that went before shall have fired another generation with a noble zeal, a noble purpose, and a generous emulation—then, perhaps, the thread here dropped, may be recovered by another hand." And when again taken up will not the Bairdian Epoch include the Couesian Period?

Part I. is styled "Field ornithology: being a manual of instructions for collecting, preparing and preserving birds." This "Field ornithology" was "originaly published as a seperate treatise in 1874," a copy of which the writer of this review secured about that time. We had been diligently trying to "stuff" an Oriole, with results anything but satisfactory. The opportune arrival of "Field Ornithology" filled an "aching void" and subsequent specimens were noticeable improvements. On again examining the pages of this book, now slightly amplified and illustrated and incorporated as a part of the "Key" our "fond recollections" are pleasantly revived and we warmly greet an old time friend. May the thousands who in the future refer to Part I of the "Key" derive as much benefit as we did from the old "Field Ornithology."

Part II is a "General Ornithology" being "an outline of the structure and classification of Birds." The first edition of the "Key," published almost twenty years ago, contains an introduction which is here used in Part II though materially enlarged. In the present shape the author styles it "a sort of 'Closet Ornithology,'" which teaches the principles of the science of Ornithology, and illustrates their application. Following this is a very important "Artificial Key to the orders and suborders" and a similar "Key to the families."

Answering as an introduction to the Synopsis, we find a "Tabular view of the groups higher than genora, adapted in this work for the classification of North American Birds," and on next page, an "Explanation of colored frontis piece," which is a drawing showing anotomy of a ♀ pigeon prepared by Dr. R. W. Schufeldt, U. S. A., from nature.

Part III. "Systematic Synopsis of North American Birds," occupying in the body of the book some 584 pages, is profusely illustrated with upwards of 450 fine wood cuts and describes 878 species and sub species of North American birds besides defining the genera and characteristics of families and higher groups.

The descriptions are elaborate, much attention being given to biographical items, nests and eggs, the song, flight, migration and other habits with technical description of the species. Geographical distribrution is given prominence as is description of the plumages of females and young birds. We also find the specific names marked as they should be accented, with their etymology concisely stated.

The Systematic synopsis of the fossil birds of North America is included in Part IV. and describes forty-six species.

The copious index, occupying thirty two pages with three columnes to the page, solid matter, is a most important feature of the book an is so complete that serves excellently "as a glossary of the terminology of ornithology."

The appendix exhibits the momenclature of the A. O. U. check-list in comparison with that of the "Key" and includes description of additional species, occupying over thirty pages.

The Second Appendix, contains all changes reported by the A. O. U. Committee up to Jan. 1890, printing in bold type those species and sub species which the author is prepared to admit to his "Key."

As the press work is by the celebrated University Press of Cambridge, it is of course, typographically as perfect as the most skillful workmen of this country can make it.

THE POPULAR SCIENCE MONTHLY. Edited by W. J. Youmans. Published by D. Appleton & Co., 1, 3, & 5 Bond Street, New York, has the following contents for July, 1891:

I.—The development of America industries since Columbus. VI. The evolution of wool spinning and weaving. By S. N. Dexter North. (Illustrated.)

II.—Man and the glacial period. By Prof. G. Fredrick Wright. (Illustrated.)

III.—Sanitary improvement in New York during the last quarter of a century. By General Emmons Clark.

IV.—Deportment of savage negroes. By Paul Reichard.

V.—Pollen: Its development and use. By Joseph F. James, M. Sc. (Illustrated.)

VI.—The meteoritic hypothesis. By J. Ellard Gore, F. R. A. S.

VII.—Our agricultural experiment stations. By Prof. C. L. Parsons.

VIII.—A coming solution of the currency question. By Charles S. Ashley

IX.—Scientific dreams of the past. By Albert de Rochas.

X.—The colors of letters. By David Starr Jordan.

XI.—Animal and plant lore. IV. By Mrs. Fanny D. Bergen (Concluded.)

XII.—Hoffding's outlines of Psychology.

XIII.—The quianganes of luzon. By Prof. F. Blumentritt.

XIV.—On the wings of the wind.

XV.—Sketch of George Catlin. (With portrait.)

XVI.—Editor's Table:—The New Jesuitism and Social Reform.—Charity as a Fetich.

XVII.—Literary Notices.

XVIII.—Popular Miscellany.

XIX.—Notes.

THE POPULAR SCIENCE MONTHLY is recommended, not only as a scientific medium through which the better scientific advancements are communicated to those only interested in scientific pursuits, but to the general reader who would seek to be enlightened by the best class of literary productions, so written as to be useful as well as entertaining.

THE TRANSIT, a semi-annual, published by the State University of Iowa, is a very interesting and instructive pamphlet, containing detailed descriptions of actual experiments carried on by the engineering depart-

ment of the institute. "The cement test," "Tests of iron and steel," "Preservation of timber" and many other articles make it well worth the price, 50 cents. Engineers, contractors and builders will find much valuable information in them which could not be gained by individual experiments without great expense for the necessary appliances used as well as loss of time required to make such tests.

The following volume, relative to the construction and maintainance of roads, has been received, the title page of which will give a very correct impression of the contents and value of the book: "A move for better roads, essays on road making and maintainance and road laws, for which prizes or honorable mention were awarded through the University of Pennsylvania by a committee of citizens of Philadelphia, with a synopsis of other contributions and a review by the secretary, Lewis M. Haupt, A. M., C. E. professor of civil engineering, University of Pennsylvania, also an introduction by William H. Rhawn, chairman of the committee."

This volume is recommended for reference to all who are interested in road-making and maintainance.

Published by Henry, Carey, Baird & Co., 810 Walnut Street, Philadelphia, Pa. Price, post paid, $2.00.

Books and other Publications Received.

KEY TO NORTH AMERICAN BIRDS. Revised Edition. Elliott Coues. Boston: Estes and Lauriat. Cloth, Price $7.50.

MISSOURI BOTANICAL GARDEN. First and Second Annual Reports respectively of 1890 and 1891. St. Louis, Mo.: Published By the Board of Trustees.

PSYCHE, monthly, $2.00 per year, single copy 20c. Published by Cambridge Entomological Club, Cambridge, Mass. A Journal of Entomology.

POPULAR SCIENCE MONTHLY. May, June and July. D. Appleton and Co, Publishers, 1, 3 and 5 Bond St., N. Y City. Single Number 50c. By the year, $5.00.

THE ELECTRICAL AGE, Weekly; Nos., 24 and 25. Published by Electric Age Pub. Co., World Building, N. Y. City, 10c per number; $3.00 per annum.

THE PHONOGRAM. March and April. Nat. Phonograph Pub. Co., L'd., World Bldg., N. Y. City, Single copies 10c. One dollar a year.

CANADIAN ENTOMOLOGIST for May. London, Ont., Canada, one dollar per year.

THE NAUTILUS, 12 pages, Monthly. $1.00 per year. 10c per copy. H. A. Pilsbry, Editor. C. W. Johnson, Associate Editor. Devoted to the interests of Conchologists.

THE OOLOGIST, 12 pages, monthly, 50c per year. Frank A. Lattin, Albion, N. Y. Devoted principally to Oology.

WEST AMERICAN SCIENTIST, Ill. 16 pages, monthly, $1.00 per year. C. R. Orcutt, San Diego, Calif. A Popular review and record for the Pacific Coast.

THE SEMI-ANNUAL, 44 pages, 35c per copy. C. C. Maxgeld, Danbury, Conn. Official organ of Wilson Ornithological Chapter of A. A.

JOURNAL OF THE CINCINNATI SOCIETY OF NATURAL HISTORY, Ill., also 2 Plates. 72 pages. Quarterly, $2.00 per annum. Published by the Society, 108 Broadway, Cincinnati, Ohio.

THE CHAUTAUQUAN for July. Dr. Theodore L. Flood, Editor, Meadville, Pa. Yearly subscription $2.00.

THE KANSAS CITY

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Official Organ of the Kansas City Academy of Science.

VOL. V. KANSAS CITY, MO., AUGUST, 1891. NO. 8

FORMERLY

THE NATURALIST.

CONTENTS.

KANSAS CITY, MO.,
ACADEMY OF SCIENCE PUB. CO.,
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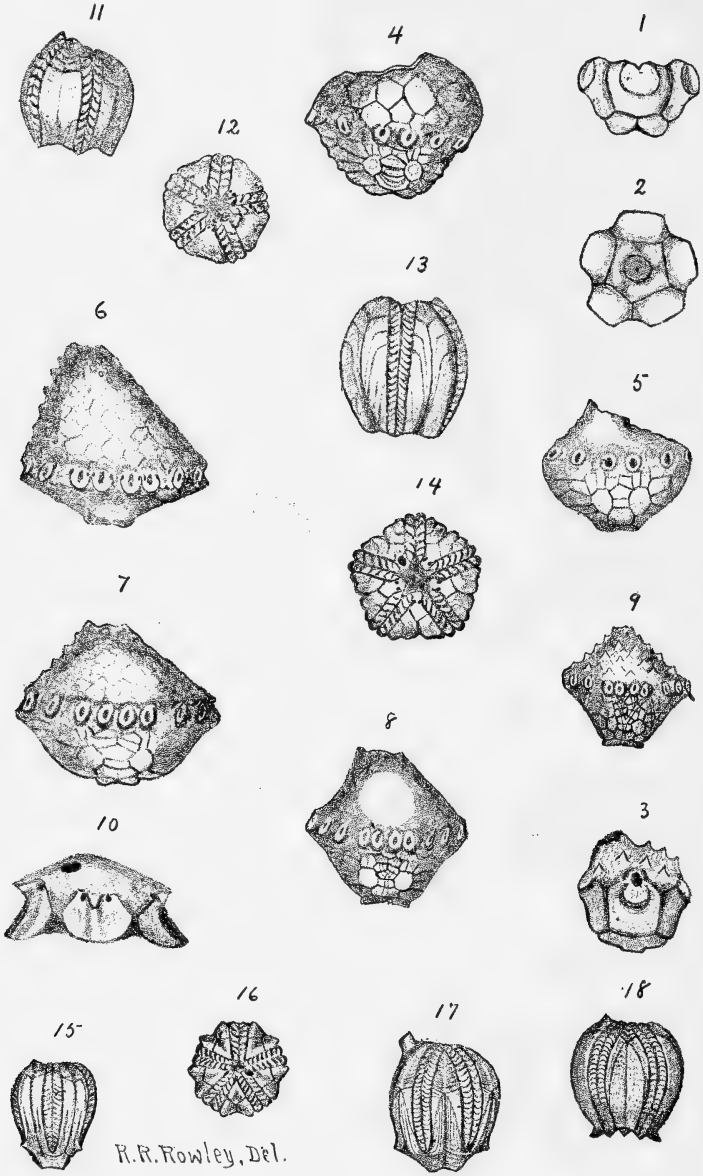


SOME NEW SPECIES OF ECHINODERMATA,

FROM THE SUB CARBONIFEROUS ROCKS OF PIKE COUNTY, MISSOURI,

BY R. R. ROWLEY AND SID. J. HARE.

Explanation of Plate III.

PLATYCRINUS CORBULIFORMIS, n. sp.

Figs. 1 and 2, side and basal views of the calyx. Natural size.

PLATYCRINUS PISUM, n. sp.

Fig. 3, side view of the body enlarged to two diameters.

DORYCRINUS INFLATUS, n. sp.

Fig. 4, side view of the body Natural size.

BATOCRINUS BULBOSUS, n. sp.

Fig. 5, lateral view of the body. Natural size.

BATOCRINUS ABSCISSUS, n. sp.

Fig. 6, side view of the body. Natural size.

BATOCRINUS GURLEYI, n. sp.

Fig. 7, side view of the body. Natural size.

BATOCRINUS SWEETI, n. sp.

Fig. 8, side view of the body. Natural size.

BATOCRINUS DAVISI, n. sp.

Fig. 9 side view of the body. Natural size.

AGARICOCRINUS DECORNIS, n. sp.

Fig. 10, side view of the body. Natural size.

GRANATOCRINUS APLATUS n. sp.

Fig. 11 and 12, side and summit view, enlarged to two diameters.

GRANATOCRINUS CONCINNULUS, n. sp.

Figs. 13 and 14 side and summit views, enlarged to two diameters.

GRANATOCRINUS PYRIFORMIS, n. sp.

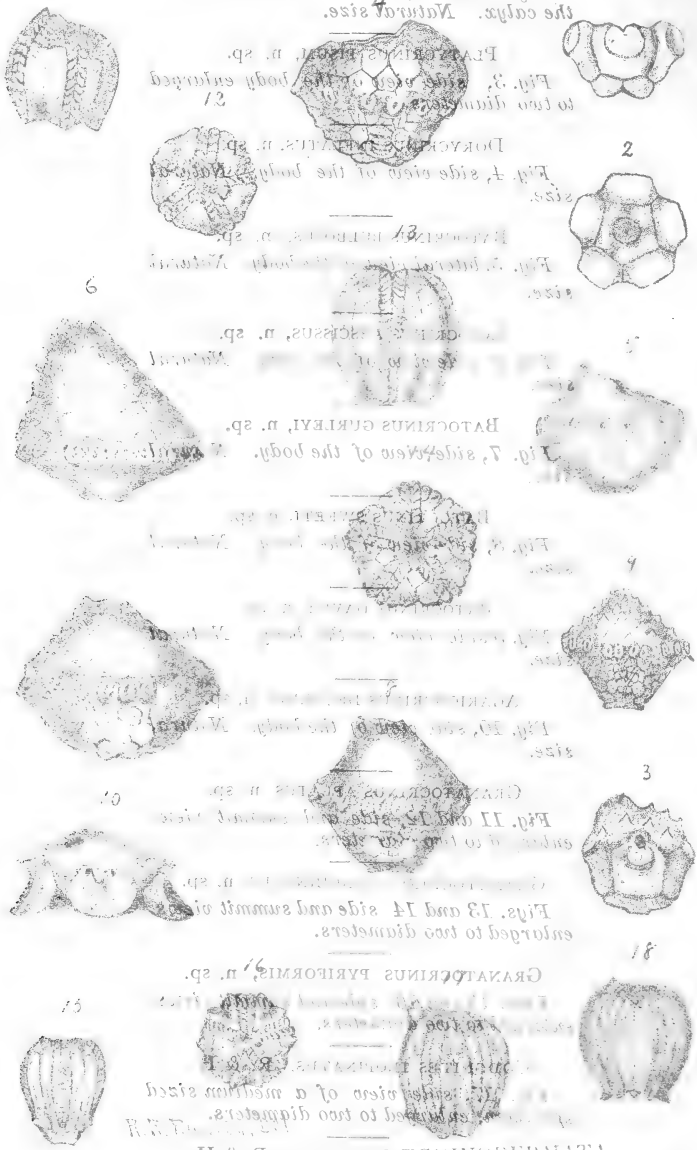
Figs. 15 and 16, side and summit views, enlarged to two diameters.

CODONITES INOPINATUS, R. & H.

Fig. 17, side view of a medium sized specimen, enlarged to two diameters.

GRANATOCRINUS EXIGUUS, R. & H.

Fig. 18, side view of the body of a globose specimen of medium size, two diameters.



SOME NEW ENTOMOSTRACA,

FROM THE CARBONIFEROUS OF JACKSON COUNTY, MISSOURI.

THE KANSAS CITY
SCIENTIST
ASTRONOMY GEOLOGY PHILOSOPHY MINERALOGY BOTANY METEOROLOGY ARCHÆOLOGY ZOOLOGY MECHANICS

Official Organ of the Kansas City Academy of Science.

VOL. V. KANSAS CITY, MO., AUGUST, 1891. NO. 8

Proceedings Kansas City Academy of Science.
July 28, 1891.

Description of some new Species of Crinoids and Blastoids from the Sub-carboniferous Rocks of Pike and Marion Counties, Mo., and Scott County, Va.

By R. R. Rowley and Sid. J. Hare.

The material from which the following descriptions have been made, was collected from the Burlington, Keokuk and Kaskaskia Limestones and, with but one exception, by Mr. R. R. Rowley in whose collection all the types are, save the figured specimen of *Batocrinus davisi*.

Platycrinus corbuliformis, n. sp.

Plate III. Figs. 1 and 2, side and basal views of the calyx. Natural size.

Calyx, basket-shaped. Basals broadly hollowed about the columnar attachment and swolen laterally into a rounded, ring like projection. The sutures of the basal plates marked by deep depressions. First radial plates a little broader than long, separated by strong depressions and so protruberant at the articulating facets for the second radials as to give a rather strong five-lobed appearance in a basal view of the calyx.

Articulating facets more than two-thirds the width of the first radials; concave and but little broader than long.

In two of the interradial areas three small plates, each, are observed, the central one pentagonal, longer than wide, while the lateral two are somewhat larger and apparently heptagonal. Surface of all plates finely granulated.

Two specimens collected from the base of the Lower Burlington Limestone at Louisiana, Mo., are the types of this species.

Platycrinus pisum, n. sp.

Plate III. Fig. 3, side view of the body enlarged to two diameters.

Body, spherical. Calyx, cup shaped. Basal plates flattened, with a slight elevation to which the column is attached. All the calyx sutures beveled. First radials about as long as wide, protuberant at the facets which latter are about one-half the width of the radials, slightly concave and but little broader than long. Interradial areas depressed. A strong lateral wart in the anal area,

covered by minute pieces marks the position of the anal opening. Anal plate protuberant and forming the back of the wart-like prominence. Dome plates crowned with short spine like nodes. Surface of the entire body granular. The upper joint of the column is round.

The collection contains but one specimen, found in the Lower Burlington Limestone at Louisiana, Mo.

DORYCRINUS INFLATUS, n. sp.

Plate III. Fig. 4, side view of the body. Natural size.

Calyx low, basket-shaped. Dome convex and very much swollen at the anal side. First radial plates slightly convex about their edges and with a scarcely noticeable central depression bounded below by a ridge-like lunule. Three of these five plates are hexagonal and two heptagonal. Width a little greater than length. Second radials quadrangular, twice as wide as long with a central elongate ridge traversing the width of the plates. Third primary radial or bifurcating plate pentagonal with a length equal to half the width. Resting on the upper sloping edge of each third radial are two series of secondary radial plates, with two plates to the series, except in the right and left posterior rays where one limb each bears a secondary bifurcating plate, supporting two arm-bearing pieces. All of the radial plates bear the central elongate ridge. First anal plate as large as first radials, width and length equal, heptagonal, with the lunule. This plate supports above, three rather large plates, the central one being octagonal and the lateral ones hexagonal. All three bear a central node like ridge. First interradial plate nearly as large as the first anal plate, ten sided, width and length equal. There are two small wedge-shaped plates above each first interradial. The twelve arm-bearing plates have a strongly toothed appearance. Basal plates pentagonal, width greater than length, excavated below for the reception of a rather strong column. Around this excavation the basal plates form a low, scarcely perceptible rim. The plates of the dome are large and without apparent ornamentation and with no central convexity. Unfortunately the two specimens found are so injured about the top of the vault that the anal opening has not been examined and the presence or absence of a central spine is a matter of conjecture only.

Found at the very base of the Lower Burlington Limestone at Louisiana, Mo.

BATOCRINUS BULBOSUS, n. sp.

Plate III. Fig. 5, lateral view of the body. Natural size.

Calyx, bowl shaped. Dome, flattened, scarcely convex away from the base of the anal tube. The plates of both calyx and vault without ornamentation and with no perceptible central convexity. Basal plates excavated for the column but forming no rim. First radials very large, width a little greater than length, hexagonal. Second radials quadrangular, width once and a half the length. Third radials of the right and left anterior rays, pentagonal, anterior one heptagonal. The right and left posterior rays have hexagonal third radials. In the anterior ray there are two series of two plates each of secondary radials. This is also the case in the right anterior ray while in the left anterior ray and one limb each of the posterior rays the second secondary plate is a bifurcating piece, supporting two arm-bearing plates above, making fourteen arms in all. Arm-bearing plates not protuberant. Openings large.

The first plate of the anal series is large, nine-sided, length and width equal. Above this plate and resting on its sloping edges are three rather large plates, two octagonal and one hexagonal. The next series above contains four smaller plates The first interradial plate, large, nine-sided. Two smaller hexagonal plates rest on the first interradial,

with one or two small elongate pieces between the arm openings. Plates of the dome large and small. Anal tube sub central, moderately strong and directed away from the anal side. Plates thick. Arm openings directed slightly upward and forming a rounded zone at the union of the vault and calyx. There is a slight constriction in the calyx, traversing the middle of the first radial plates.

Described from one specimen found at the base of the Lower Burlington Limestone at Louisiana, Mo.

BATOCRINUS ABSCISSUS, n. sp.

Plate III Fig. 6, side view of the body. Natural size.

Calyx, the inverted frustum of a low and rapidly expanding cone. Vault, a much higher cone. The arm-bearing plates form either a continuous band around the body or are divided into tooth-like projections and are sixteen in number. Basal plates form a low rounded rim above the upper stem joint. First radial plates, once and a half as wide as long and hexagonal. Second radials quadrangular less than twice as broad as long Third radials pentagonal and less than the second radials in size. The two plates of the secondary radial series are broader than long, the upper being the larger and a bifurcating plate. The radials of the third series are three or four in number, with a width twice as great as the length, some of them being quite as large as the first radials. First plate of the anal series nearly as large as the first radials, length and width being equal, heptagonal. The three plates resting above this are nearly as large, equal in dimensions, heptagonal. Two smaller plates above, one succeeding the other, complete the anal series, not reaching the arm-bearing plates. The first interradial plate, large, scarcely less than the first radials, ten sided, slightly wider than long. Two smaller plates longer than wide rest upon this with possibly one small plate still higher.

Vault high, lower plates large. The small plates on the anal side and about the base of the proboscis or ventral tube, nodose. Tube slender. The plates of the calyx as well as the larger dome plates are apparently without ornamentation.

The specimens of this species were found in the Archimedes horizon of the Keokuk Limestone on Indian Creek, six miles southwest of Curryville, Pike Co., Mo.

BATOCRINUS GURLEYI, n. sp.

Plate III. Fig. 7, side view of the body. Natural size.

Calyx convex, rounded, a low bowl in outline. Vault rather high, conical. The smaller plates of the vault are nodose. Other plates of the body without ornament. The three radials of the first series are each nearly twice as wide as long and respectively six, four and five sided and with but little difference in size. The two radials of the second series are larger than those of the first series, the upper being a bifurcating plate. The radials of the third order are three in number. Arm openings sixteen, directed outward on tooth like projections. First anal plate about as large as the first radials followed above by three smaller pieces, two long narrow plates completing the series. The plates of the interradial areas are three in number the lower one being the largest plate in the calyx. Basal plates form a low rounded rim about the column. Anal tube nearly central, not strong. This species differs from the preceding form in the deeper calyx and different outline, less elevated vault and more nearly central position of the anal tube.

Named in honor of Wm. F. E. Gurley of Danville, Ill.

Collected near the base of the Keokuk Limestone, on Indian Creek, Pike Co., Mo.

BATOCRINUS SWEETI, n. sp.

Plate III. Fig. 8, side view of the body. Natural size.

Calyx, convex, nearly deep as the dome. Basal plates excavated for the column and expanded into a rounded rim about it. First radial plates hexagonal, once and a fourth as wide as long. Second radials less than the first, quadrangular, broader than deep. Third radials scarcely larger than the second, pentagonal, wider than high. The radials of the second order are two in number, the second a bifurcating plate and both quite as large as the second and third radials of the first order. The radials of the third order are two in number, a little smaller than plates of the second order. A low angular ridge extends up each radial area bifurcating with the divisions of the rays. First plate of the azygous area is as long as wide hexagonal and as large as the first radials. Resting upon this plate are three large plates seven or eight sided. The other plates of the series can not well be made out. The first interradial piece is fully as large as the first anal plate, length and breadth equal. Three smaller plates, longer than wide above the first interradial, two of them resting upon it while the third extends between the arm-bearing plates. Low indistinct radiating lines cross the interradial and azygous plates from the centers to the suture angles. Each of the rays except the anterior, give rise to four arms and there are eighteen arm openings in all, the arm-bearing plates being divided into groups with a rather strong five-lobed appearance in a basal or top view. Dome convex, frustum of a cone, plates probably without ornamentation. Anal tube rather stout, sub-central. Column rather large. Arm openings directed outward.

The specific name is given in honor of Mr. Ralph Sweet, a young collector at Curryville, Mo.

Description from one specimen found near the base of the Keokuk Limestone on Indian Creek, six miles south-west of Curryville, Mo.

This species resembles *B. davisi* but is larger, has a five-lobed appearance in a basal view instead of a continuous rim, differs also in the apparent want of ornamentation of the dome plates and moreover it is from an entirely different horizon.

BATOCRINUS DAVISI, n. sp.

Plate III. Fig. 9 side view of the body. Natural size.

Calyx bowl-shaped. Vault a depressed cone nearly as high as the calyx. The three oblong basal plates form a low rim about the column.

First radials hexagonal, twice as wide as long. Second radials quadrangular and less than twice as wide as long. The third radial or first bifurcating plate pentagonal and but little larger than the second radial, nearly twice as wide as long. The two upper sloping sides of the third radial, each supports a series of two plates, the second of which is a secondary bifurcating plate. This latter supports above, two series of two plates each to the arm openings. Starting from the basals, a distinct ridge passes up along the middle of the radial plates, forking on the bifurcating plates and passing to the arm-bearing pieces. The arm openings are twenty in number and directed outward, not noticeably divided into series. The first interradial plate, nine-sided, about as long as wide and nearly as large as the first radials, followed above by two series of two smaller plates and these in turn by two still smaller pieces. A minute piece may be seen still higher up. The plates bearing the arm openings meet in a continuous ring.

First anal plate a little smaller than the first radial, hexagonal, width and length equal, supporting above three smaller pieces, the lateral ones being octagonal while the one in the middle is heptagonal. There are above, three very small plates. Vault pieces small, each with a small central spine-like node. Proboscis or ventral tube slender.

The specific name is in honor of Rev. John Davis of Hannibal, Mo., to whose cabinet the figured specimen belongs. Described from two specimens.

This little fossil is interesting in that it occurs at a higher geological horizon than any other Batocrinoid yet described.

Collected near Flag Pond, Va., and found associated with *Pentremites godoni* and *P. pyriformis* in the Kaskaskia Group.

AGARICOCRINUS DECORNIS, n. sp.

Plate III. Fig. 10, side view of the body. Natural size.

Basal plates form a shallow concavity, the radials extend outward horizontally and form lobe-like ridges, the interradial spaces being sunken. First radials a little broader than long. Second radials quadrangular and more than twice as broad as long. Third radials pentagonal, more than twice as broad as long, supporting on their upper sloping sides an elongate radial of the second order. The first anal plate is longer than wide; heptagonal, succeeded above by three smaller pieces. The first interradial plate is longer than wide, octagonal, and nearly as large as the first anal plate. Two small elongate pieces rest upon the first interradial plate and extend between the arm bearing plates. The anal area is sunken like the interradials. All the plates of the calyx, except the basals are slightly convex centrally. The upper faces of the first radials of the second order, form five flattened hemispherical scars directed obliquely outward, with a central longitudinal ridge. Each ray except the anterior one supports two arms each, while the latter gives rise to but one, making nine arms in all. Between the arm openings the vault plates, like small blunt spines, extend outward over the scars. Vault plates, smooth, flat, and the central one, usually in this genus a node or spine bearer, is perfectly flat. Anal opening large, a mere break in the almost flat vault.

Collected in the lower Burlington Limestone at Louisiana, Mo., the species being described from one specimen.

GRANATOCRINUS APLATUS n. sp.

Plate III. Fig. 11 and 12, side and summit view, enlarged to two diameters.

Body, globose, a little broader than long. The three basal plates are rather large, two pentagoual and one quadrangular, form a flat or slightly convex surface not visible in a side view of the body. Each ambulacral area contains about fifty side pieces; fields rather broad, not sunken below the inner radial lips, their lower extremities pointing downward, and widely separated by the great breadth of the basal area. Radial pieces less than three fourths the length of the body, flat between the ambulacra, with granular ornamentation below, and distinct lines above directed laterally, and a little obliquely upward from the radial sutures to the ambulacra. Length of interradials and anal plate about one fourth that of the entire body, flat between the ambulacra, and with a continuation of the linear ornamentation of the upper part of the radials. The lancet pieces of the ambulacra not exposed externally. Anal opening rather large with margins very prominent. Central opening large not closed in the specimens examined. Spiracles small, eight in number.

This little Blastoid bears a faint resemblance to *G. neglectus* but differs in general outline, character of the base and ornamentation. It is also from a higher geological horizon.

Of the two type specimens, the one figured was found in the Upper Burlington Limestone at Louisiana, Mo., while the other is from the same horizon on Spencer Creek, north of Curryville, Mo.

GRANATOCRINUS CONCINNULUS, n. sp.

Plate III. Figs. 13 and 14 side and summit views, enlarged to two diameters.

Body, oval. Base rather large and composed of two larger, pentagonal and one

smaller, quadrangular pieces. Base not projecting but even with the lower points of the ambulacra. Radial plates long, occupying nearly the entire length of the body in a side view, flat above between the ambulacra but concave below between the ambulacral points. Surface granular with rather strong longitudinal furrows, turning toward the ambulacra above at right angles. Interradials small and sunken a little below the ambulacral areas. Anal plate scarcely sunken. Ambulacra moderately broad, long as the length of the body as seen in a side view; side pieces numerous. The lower points of the ambulacra are blunt and directed downward. The ambulacral areas extend beyond the body surface. Central opening uncovered in the type specimen. Spiracles eight. Anal opening rather large, the edges or margins not elevated much above the surface.

A single specimen of this handsome little Blastoid, collected from the Lower Burlington Limestone at Louisiana, Mo., is all that has yet come under our observation.

GRANATOCRINUS PYRIFORMIS, n. sp.

Plate III. Figs. 15 and 16, side and summit views, enlarged to two diameters.

Body somewhat pear-shaped, widest above the middle. Base prominent and projecting.

Radial plates occupying most of the length of the body down to the basals, surface concave between the ambulacra, granular, with a distinct furrowed depression extending from the middle, either side of the radial suture, downward around the point of the ambulacra and upward to the middle on the other side.

Interradials and anal plate small and concave between the ambulacra, granular. Ambulacra broadest above the middle, tapering both ways. Side pieces sixty or more to the area. The ambulacra terminate below in little points directed outward and are sunken below the inner radial lips and interradial edges but not deeply. A top or bottom view of the body gives a rather strong pentagonal outline.

Spiracles small, scarcely discernible, probably eight in number.

Anal opening of moderate size with margins but little above the surface

Central opening small, uncovered in the specimen.

Described from a single specimen found in the Upper Burlington Limestone at Bear Creek Station, Marion Co., Mo.

CODONITES INOPINATUS,
Rowley and Hare's species.

Plate III. Fig. 17, a side view of a medium sized specimen, enlarged to two diameters to show more plainly the surface features. This and the following species were figured and described in the July number of the Kansas City Scientist.

GRANATOCRINUS EXIGUUS,
Rowley and Hare's species.

Plate III. Fig. 18, side view of the body of a globose specimen of medium size, enlarged two diameters to show surface character.

There are few of our Missouri readers who have not heard of Shaw's Garden of St. Louis. This Garden is now owned by the City of St. Louis and is known as the Missouri Botanical Garden. Two annual reports have been issued, 1890 and 1891 giving full account of the origin, object, and work of this institution.

Vol. I. for 1890 contains a biographical sketch of the life of the late Henry Shaw whose life of was devoted to beautifying and enlarging the garden. It also contains the will of Mr. Shaw, whereby the City of St. Louis came into possession of the garden.

The second annual report 1891 contains reports of officers and Directors, Anniversary Publications, Scientific papers containing much valuable information for botanists. The Missouri Botanical Garden and The Henry Shaw School of Botany are institutions of which the State should be proud.

For the Scientist.

Elliott Coues, Scientist.

The subject of this sketch is one of the few men who have become famous both in physical and in psychical science. He has long been recognized as one of the leading naturalists of America, and of late years has acquired equal distinction as a philosopher.

Dr. Coues was born in Portsmouth, N. H., Sept. 9, 1842, and is the son of Samuel Elliot Coues and Charlotte Haven Ladd Coues. His father was in business in early life with Ichabod Goodwin (afterward Governor of New Hampshire,) and later the author of several scientific treatises which anticipated some of the more modern views of physics, astronomy and geology; so that young Coues would seem to have inherited his bent of mind toward study and research. His elder half-brother is Dr. Samuel Franklin Coues, Medical Director, United States Navy. There are known no other male adults of the name, which is of Norman-French origin. Dr. Coues's father was a friend, though at one time the political opponent, of Franklin Pierce; and early in the Presidency of the later received from him an appointment in the U. S. Patent Office, which he held nearly to his death in July, 1867. His mother is still living. The family moved to Washington in 1853, and Dr. Coues has always been a resident of that city, excepting during the years he served in the West and South as an Army Officer or engaged in scientific explorations. As a boy he was educated under Jesuit influences at the Seminary now known as Gonzaga College. In 1857 he entered a Baptist College (now Columbian University), where he graduated in 1861 in the Academic department and in 1863 in the Medical department of that institution. To the degrees of A. B., A. M., Ph. D., and M. D., conferred by this College, his riper scholarship has added titles enough to fill a page from learned Societies all over the world.

While a college lad Coues was chiefly distinguished for cutting recitations and guying the professors. His taste for natural history developed early in an enthusiastic devotion to ornithology, and before he graduated he was sent by the Smithsonian Institution to collect birds in Labrador. Among his earliest writings are the account of this trip, and a treatise on the birds of the District of Columbia, both published in 1861. The authorship of the latter was shared with a fellow-student, Dr. D. W. Prentiss (now one of the leading practitioners of Washington); and both papers secured public recognition in England as well as in this country, thus making a beginning of his literary reputation.

While yet a medical student, Dr. Coues was enlisted by Secretary Stanton as Medical Cadet, U. S. Army, and served a year in one of the hospitals in Washington. On graduating in medicine in 1863 he was appointed by Surgeon-General Hammond for a year Acting Assist-

ant Surgeon U. S. A.; and on coming of age passed a successful examination for the Medical Corps of the Army. He received his commission in 1864, and was immediately ordered to duty in Arizona. His early years of service in that territory, and afterward in North and South Carolina, was utilized in investigating the natural history of those regions, respecting which he published various scientific papers. Though he wrote some professional articles during his hospital experience, Dr. Coues seems never to have been much interested in the practice of medicine and surgery, and has consequently made no enduring mark in his ostensible profession. After about ten years of ordinary military service as Post Surgeon in various places, he was in 1873, while on duty at Fort Randall, Dakota, appointed Surgeon and Naturalist of the U. S. Northern Boundery Commission, which surveyed the line along the forty-ninth Parallel from the Lake of the Woods to the Rocky Mountains. This service took him into the field in 1873 and 1874, and fortunately brought him to Washington to prepare the scientific report of his operations. His many publications, notably his "Key to North American Birds" and "Field Ornithology" which had lately appeared, had already established his reputation as a naturalist; and on the completion of the Boundery Survey in 1876, his services were secured as Secretary and Naturalist of the United States Geological and Geographical Survey of the Territories, under the late Dr. F. V. Hayden. He edited all the publications of the Survey from 1876 to 1880, meanwhile conducting Zoological explorations in the west; and during this period contributed several volumes, from his own pen, to the Reports of the Survey, notable his "Birds of the Northwest" in 1874, "Fur-bearing Animals" in 1877, "Monographs of the Rodentia" (with Prof. J. A. Allen) in 1877, "Birds of the Colorado Valley" in 1878, and several instalments of a universal "Bibliography of Ornithology." The latter work attracted special attention in Europe, and Dr. Coues was signally complimented by an invitation, signed by Darwin, Huxley, Flower, Newton, Sclater and about forty other leading British Scientists, to take up his residence in London and identify himself with the British Museum. Dr. Coues also projected and had well under way a "History of North American Mammals" which was ordered to be printed by Act of Congress; when suddenly, at the very height of his scientific researches and literary labors he was ordered by the War Department to routine medical duty on the frontier. He obeyed the order and proceeded to Arizona, but found it of course impossible to resume a life he had long since outgrown. His indignant protests being of no avail, he returned to Washington and promptly tendered his resignation from the Army, in order to continue his scientific career unhampered by red-tape. The action of the military authorities in this instance seems incomprehensible, and the true history of this episode in Dr. Coues's life remains to be written. It is believed to have resulted from personal hostility, based upon professional jealousy.

Dr. Coues had during the proceeding two decades become a member of most of the scientific societies of the United States, and of several of Europe. He received the highest technical honor to be attained by an American Scientist in his election to the Academy of Natural Science in 1877, and was for some years the youngest Academician. His candidature was based by his friends less upon the zoological works by which he was then best known, than upon his published investigations in Comparative Anatomy and Physiology, which has brought him to the front rank among biologists. The same year saw his election to the Chair of Anatomy of the National Medical

College in Washington, where he had graduated in 1863. Too many-sided to rest content with pen-work in Zoology, he now entered upon a Professorship and lectured upon his favorite branch of the medical sciences for ten years. He proved an apt and skilful instructor of youth, greatly respected and admired by his pupils. He appears to have been the first in Washington to teach human anatomy upon the broadest basis of morphology and upon the principle of evolution. One of Professor Coues's students, Dr. Frank Baker, soon secured the Chair of Anatomy in the Georgetown Medical College; and another, Dr. D. K. Shute, took his own chair in the Medical College, when he resigned in 1887, under pressure of accumulating engagements.

Prof. Coues has been nearly all his life a Collaborator of the Smithsonian Institution of Washington, and his name is most frequently mentioned in that connection. Prof. S. F. Baird, as well as Professors Louis Agassiz and Joseph Henry, was quick to recognize his ability in early years, and by invitation of the former Dr. Coues had long had an office in the Institution, though without pay. During the years that he was an ardent and successful collector in the field, his numberless specimens of natural history were presented to the United States Government, and now form no inconsiderable part of the material for study in the National Museum, of which many other naturalists, in various departments of zoology, have been able to avail themselves. Many of these specimens have been found new to science, and several have been named in compliment to their discoverer.

On his resignation from the Army, Prof. Coues resumed his briefly vacated desk at the Smithsonian, as well as his chair at the College. Among the first fruits of his renewed activity were two volumes entitled "New England Bird-Life," published in 1881, and a "Dictionary and Checklist of North American Birds," in 1882, as well as his new edition of the "Key to North American Birds," then as now recognized as the standard text-book of ornithology, and lately reprinted again in London. Professor Coues was also about this time one of the most active in founding the American Ornithologists' Union, a flourishing Association modeled on the British Society of similar name, of which he had long been a Foreign Member. He was also one of the founders of the Biological Society of Washington.

At the height of his intellectual activity in physical science, now about fifteen years ago, the spiritual side of Profesor Coues's nature seems to have first awakened, though it was not at once to find expression. He became interested in the phenomena of so-called Spiritualism, as well as in the speculations which have become known under the name of "Theosophy." Belonging destinctively to the materalistic school of thought, and sceptical to the last degree by his whole training and turn of mind, he nevertheless began to feel the inadequacy of formal orthodox science to deal with the deeper problems of human life and destiny. Convinced of the soundness of the main principles of evolution, as held by his peers in science, he wondered whether these might not be equally applicable to psychical research. In short, Coues took up the Theory of Evolution at the point where Darwin left it, and proposed to use it in explanation of the obscure phenomena of hypnotism, clairvoyance, telephathy and the like. Under his personal surroundings as a scientist this required no ordinary moral courage and determination. One of the first fruits of this daring venture is found in an address delivered in 1883 before the Philosophical Society of Washington, and afterward published under the title of "Biogen: A Speculation on the Origin and Nature of Life." "Biogen" is a

name coined by Professor Coues, which has since become incorporated in our language and been made the caption of a series of six volumes under his editorship or from his own pen, which have already passed through several successive editions.

This new departure seems to have been encouraged and confirmed by Professor Coues's visit to England in 1884, during which he received great attention from the leading scientists of London, and became a member of the British Society for Psychical Research. In spite of the organized opposition which the conservatism of science offered to his views, and in the face of no little ridicule arising from misunderstanding of his attitude toward what is called "theosophy," which certainly injured his personal prestage, Professor Coues continued his studies in psychical science, and has never hesitated to declare himself in public both with tongue and pen, until his utterances have become almost as voluminous as his earlier publications in physical science. Some of his views, once considered visionary, are already among the accepted and formulated tenets of scientific orthodoxy. He will probably live to see them all recognized, though few pioneers in new fields of thought receive their just dues until their posthumous fame is established.

For several years past Professor Coues has been deeply absorbed in yet a different kind of literary labor, that of the lexicographer. He is one of the corps of Experts of the great "Century Dictionary of the English Language" now publishing by the Century Company of New York, under the editorial supervision of Professor W. D. Whitney of Yale, the famous Sanskritist. Dr. Coues has charge of the important and very extensive departments of general biology, zoology, and comparative anatomy. The advance strides of knowledge in these branches during the past quarter of a century, with which Prof. Coues's own name is so closely identified, have resulted in the coinage of thousands of new technical words, and most of those already in use require to be defined with renewed precision as well as with changes of significance. For this vast work, which implies on the part of the experts a resurvey of the entire field of human knowledge, and the making of numberless new definitions of words, Professor Coues has shown himself peculiarly well fitted, not only by his profound erudition in his own departments, but by his habit of painstaking precision in the minutest details of dry fact.

Most men can do some things well, but nature is seldom so lavish of her gifts as to produce a genius who does all things equally well. It is rare to find one capable of incessant drudgery in the most prosaic technicalities, who is also blessed with the poetic temperament and an ardent imagination, able to array the deepest problems in a sparkling style which facinates while it convinces. Professor Coues's literary labors would kill most men; but to his grasp of mind nature has kindly joined a strong healthy body that has thus far proved capable of any demand upon physical endurance that his intellectual activity may make. He is tall and well-formed, classic in features, straight as an arrow still, with the air of the scholar though with none of the student's stoop, and shows no trace as yet of mental weariness. A magnetic personality betrays the fiery soul within, almost feminine in its swift and sure intuitions, yet most masculine in its intense intellectuality. His mainspring of action seems to be an almost passionate honesty and love of truth which leads him to the most direct methods of accomplishing his ends, and at times to an almost brutal frankness of speech which gives offense to those who do not know how to take him. Yet men envy his impressive personality, and women rave over his social charms.

So marked an individuality cannot be without enemies to whom a warm, candid and impulsive nature, almost reckless of personal consequences, too often gives occasion for detraction and calumny. Ambitious he certainly is and must be; but to charge him with vanity would be a mistake only made by those who could not analyse the springs of feeling and action in such a character, whose radical defect is that lack of self-esteem which always makes one seem to seek the applause of others because dissatisfied with one's own achievements, and painfully conscious how far one falls short of realizing one's ideals. Yet Professor Coues has every temtation to pride. He is the only contemporaneous scientist who has acquired world-wide fame in more than one branch of learning before turning fifty years of age, and whose reputation is as well assured among the people as among his peers in science. Although not past the prime of life he is already pre-eminent both in physical and psychical sciencees, recognized as an authority in the former, and as a daring pioneer in the latter. Before either of the two now famous schools of Hypnotism in France had announced their results and made their mark, Coues had made bold experiments on his own person, as well as with others, and perhaps the still bolder experiment of publicly speaking and writing upon these strange forbidden things, when loss of both social and scientific prestage seemed likely to be the price of his temerity. His hotly pressed claims of a scientific basis for religious truth, as well as of the religions element in science, and the dauntless resolution with which he set himself to apply scientific methods to the investigation of spiritualism and other psychic phenomena, brought down upon his head a storm of criticism and denunciation, which only abated when the news of the respect entertained for his views abroad reached home, and the stand he took almost alone in this country was found to be that of some of the most distinguished thinkers in England and other countries of Europe.

"Nothing succeeds like success." Professor Coues has overcome every obstacle, as well those created by his own temperament as those placed in his way by others, and may reasonably expect to find his position stronger and his recognition greater as the years advance, and as increasing numbers of scientists cultivate the fields of his pioneer exploration.

In private life Professor Coues is easy and unassuming, and one of of the most accessible of men. Though his literary labors oblige him to be miserly of his time, he seldom denies himself to any who may call. He seldom alludes to himself or his work, except in the most casual manner, as if inclined to make light of it; though always ready for an animated discussion of the problems on which his interest is centered. For a man who declares that being bored is the greatest ill of life, his patience with bores is phenomenal. Some say he has aquired a sort of double action of mind which enables him to talk affably and entertainingly with a stranger while carrying on an inward train of thought on quite another subject. Others sometimes complain that he has grown out of sympathetic touch with minds which act more slowly and heavily than his own, and there is no doubt some truth in this. Yet if there is anything which has marked his whole career, it is his readiness to impart whatever he has to give to all who are able to receive it; many are the young scientists to whom he has held out the helping hand in private, apart from his public teaching, and numberless are those in whom contact with his mind has instilled new ideas, the source of which they do not always recognize. But he can well afford to wait for his full reward. If Professor Coues has a pet aversion, after his terror of being bored,

it is for needless ceremonies and conventions and for every sort of sham or humbug, or charlatanry or ignorant pretense. Himself the most open of men, incapable of hypocrisy, and scarcely able to conduct himself with ordinary reserve, he is often deceived by designing persons, who abuse his confidence. Having nothing to conceal himself, he fancies others equally sincere, and his good nature is imposed upon by those who use him to their own advantage.

Professor Coues has been twice married. His first marriage was contracted very early in life, and proved unhappy. By his former wife he has three children, his eldest son, Elliott Baird Coues, being now a student in Harvard University. In October, 1887, he married Mrs. Mary Emily Bates of Philadelphia, a lady in every way fitted to appreciate her husband and grace his home. Possessed of ample means to indulge his tastes and pursue his investigations. Professor Coues is planning with his wife a journey around the world, to be undertaken as soon as work upon the Century Dictionary is finished, to observe for himself and gather materials for a work on psychic science, which shall at once set that department of thought on a stable basis, and furnish the key to the religious myths of the world.

Such a man cannot of course be a member of any orthodox church, or subscribe to any creed In religious matters he is an extreme radical and free-thinker. He holds the view that much of the teaching of the established churches is demonstrably false in fact and vicious in effect; that some of it is known to be such by the professors of religion, and taught from unworthy motives for immoral purposes; and yet that there is much truth, exaggerated, distorted and misunderstood, which only requires to be winnowed from the chaff to be a blessing instead of a curse, and fruitful to human welfare. He takes strong ground against the interference of the church with state affairs, and his keen satires upon ecclesiastical politics have more than once ired the clergy of the orthodox, protestant and catholic sects. Had he lived in the dark ages he would have been an arch heretic and probably gone to the stake. Another revolt of this thinker against established usuages is upon the woman question. He has intensified the theological odium that his attitude on the church questions aroused by his daring and eloquent championship of woman's equal rights in church and state, by his recent declaration that the church is the chief bulwark of woman's slavery, as it was of negro slavery before our civil war. The stand he has thus taken of late years is that of the most radical reform in society and in the church, on all the most vital questions of the time. As an agitator of such topics he shows not less courage than ability for "rousing the sleepers," as one of his critics lately remarked; and his influence upon contemporaneous thought seems likely to be still greater in the future then it has been in the past. He is such a man as the philosopher Emerson might have had in his mind's eye when he wrote: "Beware when the great God lets loose a thinker on the world."

E. S. Lawton,
Washington, D. C.

Prof. J. E. Todd of Tabor College, Tabor, Ia. has been appointed by state geologist Winslow to look up the Drift and Soess formation of this state. Prof. Todd has given this question a large amount of study, and his reports will be looked for with interest by the students of Geology.

Mr. Todd spent several days in Kansas City and vicinity taking notes of the Drift and Soess deposit in this locality.

For the Scientist.

Some Rarae Aves Among Kansas Ducks.

By Vernon L. Kellogg.

We of Kansas are given to claiming many things, and thus it comes that the phrase "Kansas birds" includes many birds which belong anywhere but to Kansas. Of the three hundred and forty three species and sub-species of birds listed in Col. Goss's "History of the Birds of Kansas" but about sixty are really Kansas bird-residents. About ninty are summer residents and one hundred and twenty-five birds of passage. Among these migratories are most of the Kansas ducks, although a few of the web footed waterfowl are becoming so taken with Kansas that they are thinking of making permanent homes here.

Of the three Mergansers found in Kansas during the winter the Red-brested (*Mergus serrator*) is rare. *Americanus*, the American or Buff-breasted Merganser is not uncommon, especially along the Kansas river, and is not infrequently brought in by hunters and offered to the University Museum as *serrator*. The Red-breasted has been noted in the Kansas river and one was shot near Emporia some years ago. *Serrator*, male, is easily dis inguished from the common *americanus* by the pointed occipita' crest, cinnamon breast and white belly. The female *serrator* resembles the female *americanus* but is smaller, and its nostrils are near the base of the mandible, and not near the middle of the mandible as in *americanus*. Among the Teal the curious red plumage of the male Cinnamon Teal, (*Anas cyanoptera*) is rarely seen, especially in the eastern half of the state. The female cannot be distinguished from the female of the Blue-winged, except when in hand, and after close scrutiny.

The bill in *cyanoptera* is markedly larger than in *discors*; the plumage is darker and only the upper throat is unstreaked. There is no record of the capture of the Cinnamon at Lawrence and I believe that a male shot at Emporia in 1884 by A. L. Bennett is the most eastern record for the state. This specimen was in company of several Blue-wings, male and female.

Of the two Scaups found in the state the Greater or American is rarely seen, but the Lesser is one of our commonest river-ducks and well known to sportsman. The Greater however is being found more often, at least, on the Kansas river, of late years, and is not the rarety that the other *rarae aves* mentioned in these notes are. The Greater Scaup is easily distinguished from the Lesser by its size, averaging three inches longer; the plumage markings in the two forms are identical.

The American Golden-Eye (*Glaucionetta clangula americana*) is another Kansas rarity. It has been taken several times in the state, having come under my notice in Emporia and in Lawrence. The Emporia specimen was shot on a small shallow pond, a favorite haunt of the marsh ducks as Shovellers, Teal, etc. The specimen is a male in good plumage, and is now in the collections of the State Normal at Emporia, The University Collections contain two Kansas specimens. Col. Goss noted the Golden Eye at Neosho Falls, and doubtless elsewhere in the state.

The rarest of all the rare from Kansas is the Surf Scoter (*Oidemia perspicillata*) a single specimen, young male, having been shot on the Kansas river within the corporate limits of Lawrence, October 29, 1887. It is remarkable that this sea duck should have even strayed into Kansas, and its single occurence is hardly basis for hope of seeing others. The bird was shot by Mr. A. L. Bennett, who has been notably successful in finding rare ducks.

Prehaps the most interesting duck forms in the state are those few captures until recently presumed to be specimens of the Black Duck (*Anas obscura*). Col. Goss lists both *obscura*, and Sennett's new Texas form *maculosa* (reduced at Col. Goss's suggestion to a sub species of *fulvigula*) in his "History". But Mr. Goss did not believe that the typical *obscura* had ever been taken in the state, saying as much in a conversation had shortly before his death, and entered *obscura* only in deference to other reports of its presence in the southwest. Col. Goss shot the pair in the Goss Ornithological Collection, at Neosho Falls, and decides them to be the Texas form. I have a female which I captured near Emporia, and while approaching the Texas form it yet offers considerable difference in plumage. It seems to me not improbable that we may have an inland form differing from the Gulf type, inasmuch as geographical conditions are apparently very influential in determining variations from the parent form, *obscura*. As the matter now stands, we have the Black Duck (*A. obscura*) along the Labrador and the north-east coast, the Florida Duck (*A fulvigula*) along the south-east coast, and the Mottled Duck (*A. f. maculosa*) from Texas. I hope to offer some further notes on the occurence of the Kansas Black Ducks in the near future.

The capture of any of these rare forms in Kansas by bird-students should be promptly made known; the SCIENTIST's columns are doubtless open to any such interesting notes.* I shall esteem it a favor to be personally informed of any such captures, and do especially solicit information concerning Kansas or Missouri captures of the Black duck or any of its variations.

* The SCIENTIST will always be happy to receive such Ornithological notes, and will take pleasure in publishing everything of value in that line.

EIGHTH ANNUAL REPORT OF THE UNITED STATES GEOLOGICAL SURVEY TO THE SEC'Y OF THE INTERIOR. 1886-'87. BY J. W. POWELL, DIRECTOR.

Parts I. and II.
WASHINGTON, D. C.
Government Printing Office.
1889.

This is a report of work began by Mr. Clarence King in 1879 and so ably carried on since 1880, under the directions of Major J. W. Powell, and is "A Geological survey and Classification of the public lands, and Examination of the Geological Structure, Mineral Resources and Products of the National Domain."

Part I. Contains an outline of the plan of organization, and a review of the work done in the years 1886-'87 by the Director, J. W. Powell.

The Quaternary histoty of Mona Valley, California, by Israel C. Russal; Geology of the Lossen Peak district by J. S. Diller. The Fossil Butterflies of Floressant," by S. H. Scudder.

Part II. Consists of an elaborate paper by Edward Orton on "The Trenton Limestone as a Source of Petrolium and Inflamable Gas in Ohio and Indiana;" paper by Lester F. Ward on "The Geographical Distribution of Fossil Plants;" a paper entitled "Summary of the Geology of the Quicksilver Deposits of the Pacific Slope" by George F. Becker and a paper by Professor N. S. Shaler, on "The Geology of Mount Desert Island, Maine."

Altogether an interesting report from one end to the other, abounding in matters of the greatest practical as well as scientific value. Not the least interesting of which is the discussion of the business methods of the Survey.

The question of how to conduct a geological Survey so as to get the best scientific results with least expenditure of the public moneys, and this without hampering the individuality and enthusiasm of the worker, is just now an important question in connection with the State Survey of Missouri.

The Scientist.

FORMERLY THE NATURALIST.

Entered at Kansas City, Mo., for transmission through the mails at second class rates.

KANSAS CITY, AUGUST, 1891.

A Monthly Journal, devoted to all branches of

SCIENCE.

The Academy of Science Pub. Co.,
Publishers and Proprietors,
Kansas City, - - Missouri.
R. B. Trouslot, Editor.
Associates: Joseph Sharp, M. D., E. Butts, David H. Todd and Sid. J. Hare.

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Ed. SCIENTIST, KANSAS CITY. Mo.

For the Scientist.

Proceedings of the Academy Without a Programme.

It is curious how school boys, and even men, will take up the most intricate subjects for an impromptu discussion; in other words, talk off hand of things they know least about. Something of this kind happened at the last meeting (Aug. 4th) of the Academy of Science. One member spoke of having seen clippings from a country newspaper in New Jersey, as far back as 1837, in which the writer advocated the unity of heat, light and electricity. The same speaker related some recent experiments of a professor of Physics in one of the Universities in this country, in which vibrations in a wire of given length at increasing rate per second, first gave off sound from the lowest to the highest pitch, then gave off heat with a dull red glow of the wire, and finally light, with the wire incandescent.

Another member called attention to the property of Selenium, of giving off sound from rays of light falling on it, the tone varying with the color of the light.

Another, to the generalization of Cooke in his "New Chemistry." "That matter was indestructable and measured by weight." "Force indestructable and measured by work." "Intelligence indestructable and measured by adaptability" as contemplating all the phases of nature. He further said as none of the forms of matter known to us, even the elements, are the primary form, in like manner probably no one of the physical forces is the mother of all the rest, but all one, the result of something that had gone before. Further, that our senses are only adjusted to secure a small part of the vibrations in nature, and consequently we soon reach the limitation of our knowledge.

Finally, the utilitarian dreamer of the Academy spoke of the possibility of perfecting the receiving and transmitting apparatus of something similar to a telephone, so that the rays of light from a picture or scene could be transmitted to a distant point, so that we could not only converse with, but actually see the person with whom we were talking. Before the time of the telephone, microphone or phonagraph, such a statement as the latter would have been saluted by a half dozen of the members making a movement of the right arm similar to winding of the windlass. As it was very warm, the members drifted homeward lazily considering the possibility.—J. S.

Exchanges and Reviews.

Taxidermy and Zoological Collecting, by Wm T. Harnaday, 362 pp., 24 plates and 85 other illustrations. Price in cloth $2.50 net. Chas. Scribners' Sons. Publishers, New York.

Wm. T. Harnaday, its author, has been Chief Taxidermist of the U.S. National Museum for eight (8) years. This aught to insure a work on taxidermy of considerable importance. That he "seems enclined to make sport of anatomy in its relations to taxidermy" is to be regretted. Never the less, it will prove a most valuable addition to any Taxidermist's library, professional or otherwise. We bespeak for the work an extensive sale.

As the well known firm Messrs. Chas. Scribners' Sons, New York City are the publishers, it is of course a most excellently printed and bound volume.

Elements of Entomology, by Noble M. Eberhart, Ph. D., Sc. D., F. S. Sc. (London) is just the book for amateurs as well as the general public who so often wish to know the names of the many curious insects find around us. It contains forty full page plates and has over 300 figures accurately illustrating the peculiar markings of each, with a description of color markings thus making it in every sense a *ready reference* for naming insects. It also contains full directions for collecting, preserving and mounting of insects. The young collector cannot afford to be without this book. Price 35 cts. For sale by A. Flanagan, Publisher, Chicago

Important Meetings.

The International Geological Society and the American Geological Society meet at Washington, D. C., Aug. 26th, and remain in session till Sept. 4th. The leading Geologists of the Old World are expected, and the Geologists and Palæontologists of the U. S. will be present in force. An entertaining programme has been prepared and matters of importance will be discussed, a synopsis of which will appear in next Scientist.

Discoverers of Electricity.

Some two thousand years ago we obtrined our first knowledge of electricity from the discovery that amber when rubbed attracted light articles. This knowledge profited us but little up to within the last hundred years when research in this direction became more active.

The name of Dr. Gilbert, who was first physicion to Queen Elizabeth, appears prominently connected with early electrical researches. But not till Franklin's time was electricity ever applied to the affairs of every day life, he being the originator of the "lightning rod."

Other laws governing the phenomena of electricity were discovered from time to time. Sir Humphrey Davy's historic battery of 2000 cells in 1810, was the source of the first flashes of the electric arc. Michall Faraday, a blacksmith's son, having been one of Davy's assistants continued his experiments alone and eventually discovered the principal which is now involved in all dynamos, which to-day produce the electric energy flooding the civilized towns and cities of the world with light. The end is yet to come.

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The Twenty Third Annual Session will begin Oct. 6th, 1891. Commencement, March 15th, 1892. Three Years graded course. For particulars address:

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Official Organ of the Kansas City Academy of Science.

VOL. V. KANSAS CITY, MO., SEPTEMBER 1891. NO. 9

FORMERLY

THE NATURALIST.

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KANSAS CITY, MO.,
ACADEMY OF SCIENCE PUB. CO.,
Publishers.

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Proceedings of the Kansas City Academy of Science, April, 1891.

The Mound Builders.

Once upon a time there lived a people; we commence this short sketch in this rough, old fairy tale style because the only evidence we have of this wonderful people is that left us by the most reliable, as far as she goes, of all historians Dame Nature.

The facts are written on the open page of Nature and are scattered broadcast over our mighty land. Our hills, our valleys, our plains testify to the existence of a powerful, intelligent and indefatigable people. Of them we know nothing, where they originated, how they lived, or where they vanished we can merely conjecture. Nature is a historian that we can not doubt, but she oftenleaves us such interesting mysteries to task the ingenuity, acuteness and the researching powers of man. It is not for us in this hasty sketch to decide these questions as to their origin or final disappearance which have for the last forty years worried the minds of such specialists as Squier, Davis, Lapham, Foster, Force and others, but to merely state a few interesting facts in this connection, that may lead you to delve deeper into the subject, one that has as yet been hardly touched in modern research.

Their works are widely scattered from the Lakes on the North to Florida and Louisiana on the South, from New York and Pennsylvania on the East to Arizona and New Mexico on the West. The Mounds in the different parts of the country differ greatly in some respects so much so as to lead certain archaeologists to say they were made by different tribes or classes of people, but these differences are no doubt due to natural causes and circumstances, the result of association, and the nature of their environments. The mounds left by those living on the outskirts of the nation naturally running to fortifications and inclosures, while those living in the interior, in the well protected regions running to truncated cones, flat top parallelograms places used for worship and council meetings.

In Wisconsin and on the shore of Lake Superior and Michigan the mounds are built in the most remarkable and picturesque shapes, resembling, if your imagination is quite vivid, various animals and birds peculiar to that region. One called the "Turtle Mound" has a body

fifty-six feet long and the tail over 250 feet long and six feet high. This, by the way is a very odd shaped turtle,no doubt a pre-historic one. Another resembles a man walking with one foot raised, this mound is 214 feet long. Another has a very gracefully curved tail 329 feet long while the body is only 160 feet. Mr. Canfield describes a mound in Wisconsin as resembling a "night hawk" the expanded wings measuring 250 feet across.

In Adams Co. Ohio there is a mound called the "Great Serpent." This winds in graceful undulations from the head and ends in a triple coil at the tail and is 700 feet long.

The most of the mounds of Ohio and New York are in the shape of earth works and fortifications, some of them magnificent systems of works showing a skill and knowledge of defensive warfare only possessed by an intelligent and powerful people who had come to stay. These lines of defenses crown the hills all along the banks of the Ohio, Wabash, Miami and Muskingum rivers, extending for miles at a stretch and built in such a perfect manner as to exist well defined to this day.

The number of mounds in Ohio alone is estimated to be 10 000, and the number of enclosures at 1,500. This shows that the region must have sustained a numerous population and their support was almost entirely derived from agricultute.

At Falls River, Ala. there are three chambers hewn out of the solid rock. The Yond Mt, Campbell Co. Ga., is a cone crested with trees, but with almost perpendicular sides and inaccessible, except at one point which is protected by a stone wall. Stone Mt. is another Mountain that was used by these people It has only one point that could be assailed and that place was also protected by a stone wall.

Passing from here to the Mississippi Valley we strike an entirely different class of mounds, those belonging to a peaceful people. The region of the most wonderful of these mounds is that surrounding St. Louis and across the river into Southern Illinois. Here no doubt lived the rulers of the nation and here are found some of the greatest works. The great mound at East St. Louis the Cahokia, is a parallelogram seven hundred by five hundred and ninety feet high. On the south-eastern part of this is a terrace 200 by 150 feet, this was reached by a graded roadway. From this platform there arose a conical mound 10 ft high which yielded on exploration human bones, funeral vases and various implements of stone. This mass of earth contains about 1,000,000 cubic yards and in these days with all the conveniences used by our contractors it would take a long time to move it. It is hard to conceive the length of time it must have taken those people without horses or mules, scrapers or wagons.

St. Louis is often called the Mound City from the number of mounds found there when first settled. In this region are found innumerable smaller mounds that contain stone cists or boxes, made of slabs of limestone or slate, enclosing human bones. In these graves were found beautiful specimens of pottery in the shape of drinking vessels, statuettes and funeral urns. All the relics found in this region indicate a higher class of art than those found in any other region indicating that here was the center of culture and art and very likely the seat of government.

That Mississippi and Louisiana was densely peopled by these energetic and thrifty inhabitants is evidenced by the great number of mounds, dykes and levees. All those places that would have been selected as favorable spots for planting by modern agriculturists show evidence of having been kept in a constant state of cultivation, and must have been to have supported the population that

lived in this region.

Near Seltzertown, Miss., there is a mound measuring 600 by 400 feet, covering nearly six acres. It is built with reference to the cardinal points, the greatest length being East and West; it is 40 feet high and is accessible by a graded way which leads to a platform of four acres on the top. On this platform rise three conical mounds, one at each end and one in the centre. This mound is surrounded by a ditch with an average depth of 10 feet. Numerous skeletons, vases filled with pigments, ornaments and ashes indicating burnt offerings have been found on exploring this mound. The north side is walled with sun burned brick some of which show impressions of human hands.

There have been found in various parts of the country from the Gulf to the Lakes, on examining mounds copper implements, images and ornaments, some of them covered with silver, mica plates and shell ornaments at such remote distances from the places where they are found native as to show an intimate relation between the people in different parts of the country.

On the shores of Lake Superior are evidences that at a very ancient date there lived people who showed considerable skill in mining copper. Samuel O. Knapp a former superintendent of the Minnesota Mining Co., discovered, in prospecting a trench 18 feet deep, in this, on rollers, resting on sleepers of oak, he found a mass of copper 10 feet long by 3 feet wide and 2 feet thick, weighing six tons. From numerous trenches and tunnels in this region, he has removed about ten cart loads of stone hammers and sledges. As an evidence of the age of these works he found a hemlock growing on a waste dump which showed on being cut down, 395 annual rings of growth.

Large plates of mica have been found in many of the mounds of Ohio and the West, and it was not until Prof. Kerr, State Geologist of North Carolina, discovered evidences of their works in the mica regions of that state, could it be imagined from where they came.

There has been found in many of the mounds cloth of a rather coarse texture made from a fine quality of what appears to be hemp. They had several styles of wearing and showed considerable skill in the manufacture.

To close, we will make a brief summary.

As to the origin of this people we know nothing and evidences are not such that we can even conjecture. What became of them has been the subject of numerous and exhaustive papers with no definite conclusion.

It is hardly reasonable to suppose that a people with fixed habitations and methodical pursuits, with a fair knowledge of art, who manufactured a superior class of pottery and had a knowledge of working metals and the manufacture of cloth, who collected salt by evaporation and knew of its curative properties would degenerate into a race of people with wild nomadic habits, a fierce, cruel, warlike race, with no knowledge of these most useful industries, who spend their time hunting and fishing and spurn all attempts at civilization, who clothe themselves in skins and cure their game by drying.

It seems much more reasonable to imagine that these mound builders were driven from the country by a more warlike people, and finally drifted into Mexico and South America, where they developed that primitive civilization and knowledge of art, until they became a nation, the remains of whose works even now call forth the wonder and admiration of the world.—*Ambler Harper.*

The rain makers should have success, as they have chosen the equinoxial period to experiment in.

Written for the Scientist.

Intuition.

By Julia Brown Strode.

That which is termed instinct in animals is known as intuition in man. Intuition sprang from instinct. It is higher than instinct. It is conscious instinct. Intuition is the mind's invisible attachment, as it were to the source of all wisdom. "It is a secret that every intellectual man quickly learns." Says Emerson, "that beyond the energy of his possessed and conscious intellect, he is capable of a new energy, (as of an intellect doubled on itself,) that, besides his privacy of power as an individual man, there is always a great public power, on which he can draw by unlocking, at all risks his human doors, and suffering the etherial tides to roll and circulate through him." Not all men are aware of this public power to which they have access, or are capable of throwing wide the human doors that its rich stream of knowledge may decend into them, and if it enters unbidden, unconscious of its value, they decide upon its information by the power of reason. Reason is a development of man's private intellect.

It is that faculty which decides upon all questions submitted to the human mind for judgment. Reason, rather than intuition, has been the acknowledged guide of the intellect for ages. It has been an aid to man's advancement, and at times a cause of his decline. It can be used either for good or evil, defend right or wrong.

The wrong doer is often justified by the close reasoning lawyer. To reason we are indebted for the most useful inventions as well as the cruelest devices of torture. Reason studies, weighs, decides. Intuition perceives. Yet I by no means wish to depreciate the value of human reason, though, it is of intellect not of spirit, of head not of heart. It has its high and mighty office and its inestimable value as one of the powers. But for years man has sought to develop the reasoning faculties while he has ignored intuition. He has depended upon the reasoning power alone, seldom consciously availing himself of intuition, knowledge or instinct, until he is hardly conscious of possessing such a faculty, or if aware of its presence, has more or less ceased to obey its voice. Unless strongly individualized, he allows himself to be more often guided by forces and opinions from without than by this inner sense. Yet it is a faculty by no means dormant, and, although ignored, it is even yet in a thousand ways his unacknowledged guide. It is the true inner light of every man. For you it may shine on one path, for myself it may illuminate another. But those paths we had rather travel, you, your path, I mine, for they lead to the goal of our genius. You would learn of the stars. Intuition whispers a knowledge of them unattainable by other men until a desire for such knowledge has seized upon them as strongly as upon yourself. Then will it speak to them. And so of all knowledge in whatever field. You would know a truth. Believe me, it is already within your own being decended from the divine mind, as it were, and seeks to reveal itself to your intelligence. The desire for it is proof of its presence within you. But we toil unremittingly, we reason unceasingly, we give the most violent directions to our will, we wrestle with all past knowledge and experience, and see aid from their teaching, or else we kneel, and beg, and conform, and become, nay are pensioners of the ideas of other men, instead of insisting on a revelation of the truths within ourselves. It is there obedient to our intelligent demand. Seek that which you would know dilligently, then allow the intellect to rest, put yourself in a passive state, and that which you seek will surely reveal itself to you accompanied by other and corresponding truths.

Who has not sought to reason out a problem or searched with absorbing assiduity after some truth without avail? Then suddenly in the still hours of the night, or at some quiet time when the mind is passive,

the answer to what you sought has rushed home to you, like a wave of light, and all is plain.

Some one has termed this a rapid and involuntary process of the reasoning powers. It is more than this, it often decides upon the evidence of the senses and brings one to a conclusion altogether contrary to the decision which would necessarily have been evolved from the direction which had heretofore been taken by the reasoning faculties. But you laid siege to the shrine of truth and she surrendered herself unto you.

What writer has not been impelled to write, yet known a perfect dearth of ideas, even the lack of a subject? Yet after repeated trials and instances on self he has found suddenly rising within him thoughts he could hardly recognize as his own, and had them flow thus for hours. This has been termed inspiration. It is the voice of intuition answering the demand of the intellect.

Have you a knowledge of the person's character whom you meet? You should have this knowledge. It is inborn, cultivate it. But you say people do not act their real selves. No, but you should be able to see beyond any disguise to the nature of things. You have, if you are not stupid, what you term "impressions." They are the revelations of intuition, that which is known to the devout mind as the voice of God, "the still small voice". Obey its prompting guidance and be led aright. Yet how, with the attachment of truth, this well-spring of knowledge within ourselevs we kneel, and beg, and conform adhere! Let us fearlessly listen to the opinions of other men, the revelation of past knowledge, but what says our own spirit, our own inner light? What is truth for you, will be right for all the world.

"Let us be wise and not impede the soul, Let her work as she will. Let us have one creative energy, one incessant revelation. Let it take what form it will and let us not bind it by the past, to man or woman.

Written for the Scientist.

Special Uses of Leaves.

By Jessie C. Drew.

Nature does nothing without a purpose, though indeed, it is sometimes hard to discover it in her various pranks. The odd and curious shaped leaves that we find on many plants have their special use. The pitcher shaped leaves of the Sarracenias or pitcher plants are used for the capture and maceration of insects. The leaf consists of a hollow dorsal portion, with a wing-like appendage forming the ventral border. S. purpurea, the only species north of Virginia has open pitchers partially filled with water and drowning insects. In S. psittacina, the inflated hood excludes rain from the pitchers. The water these contain is evidently a secretion. Insects are lured into the pitchers by a sweet secretion around the orifice. The Darlingtonia Californica has beneath the inflated hood a two-forked appendage covered on the inner face with a sweet secretion, which allures insects to the orifice. In the early season this secretion forms a trail on the edge of the wing from near the ground up to the orifice of the pitcher. The Nepenthes, inhabiting tropical Asiatic and African islands are somewhat woody climbing plants. The tendril appears to be a prolongation of the midrib of the leaf, and on its apex a pitcher, with a hinged lid, is developed. The aquatic sacs of the Utricularia or Bladderwort are morphologically leaves or parts of leaves. These sacs are always under water and have a valve-like lid which prevents the escape of anything entrapped. The leaves of the Drosera or Sunden are covered with bristly hairs each tipped with a gland containing a drop of a glairy liquid which is tenacious enough to hold fast a fly, or small insect lighting upon it. Adjacent bristles bend forward and help to retain the insect and gradually the leaf closes and feeds upon

its captive.

The Dionaea muscipula (Venus's fly-trap) grows only in the sandy eastern border of North Carolina. Insects are caught and digested by means of a two-valved body at the top of each leaf. When an insect touches one of the short bristles on the upper surface, the trap closes so quickly as to capture the insect. The marginal bristles intercross preventing its escape. A glairy secretion is poured out from numerous glands and macerates the insect. When this is all absorbed the trap opens and is ready for the next unwary fly.

Some leaves are used for the storage of nutritious matter. The green exterior of leaves of the Century plant or Agave serves as foliage, while the interior is a storehouse of farinaceous matter. In the leaves of the White Lily the lower part thickened with nourishment forms one of the bulb scales, while the upper part is of normal texture and use.

Some of the leaflets of the compound leaves of Vetches are transformed into tendrils for climbing. In many cases the transformation of the leaves causes them to loose all resemblence to their normal state, as the spines of the Barberry, and the tendrils of Lathyrus Aphaca.

The Annual Meeting of Geologists.

The American Association for the advancement of Science met in Washington City, Aug. 17th to 25th.

The Geological Society of America, met Aug. 24th and 25th, at the same place.

The International Congress of Geologists met Aug. 26th to Sept. 1st.

The Am. Ass. Ad. Sci. was well attended numbering in all six hundred and fifty-three persons, fifteen of these were from Missouri. The Geological Section was well represented by the most prominent and active Geologists in America.

Prof. Jos. LeConte of the University of California, was elected President for the next year, and the time and place of next meeting fixed for Rochester, N. Y. on the third Wednesday of August 1892.

The Geological Society of America, has been in existence three years, and numbers 220 fellows. The state of Missuori was represented by the following workers in the Geological field; Mr. A. Winslow, State Geologist, H. A. Wheeler R. F. of St. Louis, Jno. H. Frick, A. M. of the Central Wesleyan Coll, Warrenton Mo., and Prof. G. C. Broadhead, of the State University at Columbia, Mo.

To be a member of this Society, one must be an active working Geologist, and an author of approved Geological works.

At the opening session of the Geological Society, Prof. N. H. Winchell read a memorial tribute to the late Alexander Winchell, which brought out fitting remarks from Dr. C. A. White.

Prof. Krassnof of Russia made some interesting remarks on the "Black Earth of the Steppes of Southern Russia." In this Prof G.C. Broadhead answered that he had also previously thought of this earth in the same way as Prof. K. its close resemblance to our own black prairie soils. In this country such soils occur in Illinois, Missouri, Kansas, Texas and Nebraska. In Missouri, Illinois and Kansas it rests on the upper coal measures and prevails where limestones do, in northwest Missouri and Illinois it rests on the drift.

Certain tracks were exhibited from the Triassic of York Co. Pa., and remarks made upon these and others from the Connecticut Valley. Prof. Broadhead announced that a new horizon for tracks had been discovered in Kansas City, Mo, in beds of well marked upper coal measures and that Mr. E. Butts had made the discovery, and had described them in the February and March numbers of the Kansas City SCIENTIST, and that Mr. Sid. J. Hare, of Kansas City, had all the type

specimens and duplicates in his possession. Prof. Hitchcock was very much interested in the announcement as he had not heard of the discovery before.

Prof. Safford of Nashville, Tenn, exhibited bones of Megalonix, recently discovered in a cave in Middle Tennessee. Prof. Cope stated that the Megalonix was peculiar to North America, not occurring south of temperate regions. Many other interesting papers were read and discussed.

Many of the members of the International Congress were in attendance and took part in the discussion of the Geological Society.

The International Congress was well attended, there were about Sixty Europeans. Among other members present were many eminent geologists from all parts of the world, including representatives of nearly all of the great scientific institutions of Europe and America.

The countries represented were Austria, Hungary, Chili, France, Germany, Great Britian, Mexico, Roumania, Russia, Sweden and Switzerland.

The first regular session of the Congress was in the afternoon of Aug. 26th. Prof. LeConte presided.

Officers were elected as follows:

Honorary presidents—J. D. Dana, and James Hall.

President—J. S. Newberry.

A list of vice-presidents from the various countries represented.

General secretaries—H. S. Williams and S. E. Emmons.

Secretaries—J. C. Branner, Emanuel DeMargaries, G. H Williams, Dr. F F. French, Dr. Diener and Whitman Cross.

Treasurer—Arnold Hague.

Preliminary steps were taken to form an organization of the directors of the state and National Geological Surveys, a meeting for this purpose was held at the Columbian University Aug. 29th. There were present Major J. W. Powell, director of the United States geological survey; Prof. James Hall, New York; Prof. J. M. Safford, Tennessee; Prof. J, ,W Spencer, Georgia; Prof. E. A. Smith, Alabama; Mr. Arthur Winslow, Missouri; Mr. E. T. Dumblo, state geologist of Texas; Prof. S. Lindahl. As a result of this meeting a committee of six was elected to consider the matter of organization, with the power to frame a constitution and by-laws, to be reported to the association at a time and place to be selected by the committee.

After the Congress had adjourned Sept 1st, a party composed of some sixty foreigners and twenty Americans started West on a special train of Pullman vestibuled cars furnished by the Baltimore & Ohio Railroad Company, in charge of special agent, Raymond Whitcomb. The train will run independently of regular trains and will be the home of the par y during the principal portion of the journey. In each region of special geological interest the party will be guided by a geologist familiar with the ground.

The route arranged for the main line of the excursion is more than 6,000 miles in length and traverses 39 deg. of longitude. It crosses twenty of the states and territories and a province of Canada. The route will be from this city westward over the Baltimore and Ohio railroad, passing through Harper's Ferry. Cumberland and the famous Cheat river mountain region, crossing the Ohio river at Bellaire; thence to Chicago and the Northwest, along the Northern Pacific and to the Yellowstone Park, where a stay of six days will be made. The party will be guided by Messrs Arnold Hague and Joseph P. Giddings, of the geological survey. Leaving the park, the party will go to the head waters of the Missouri and spend a day at the mines in Butte City, thence southward through Idaho and Utah to Salt Lake City.

Excursions from the latter place will be taken under the guidance of Mr. G. K.

Gilbert. The journey will then be through the canons of Colorado, under the direction of Messrs S. E Emkins and Whitman C. Ross. Manitou Springs, the Garden of the Gods, Denver and other points of interest will be visited. Chicago and Niagara Falls will be stopping places on the homeward trip, and on September 26th the party will reach New York city.

Written for the Scientist.

The Electrical Theory.

By W. F. Foster, Meteorologist.

Twenty three hundred years ago, Aristotle declared there is but one single universal force, and that declaration entitles him to be called the "father of science". But the dark ages came and crushed that truth to earth to rise again in the last years of the 19th century. When the clouds of the dark ages began to clear away a great mind declared a half truth in the nebular theory of creation, which for more than a century has been taken as the basis of astronomy, geology and meteorology. This nebular theory, like the Ptolmaic theory of astronomy, is requiring of our astronomers, geologists and meteorologists constant inventions to make the nebular hypothesis and its consequent heat theory of force hold together, and these invented theories are becoming so numerous that the nebular theory is tottering to its fall. For the salvation of science it is just as necessary to return to the unity of force, as announced by Aristotle, as it was to Christianity that Paul should establish the unity of spiritual force in the truth of one God. The nebular theory stands to scientific truth in about the same relation that the theory of a million Gods did to true religion in the days of Christ. If we go back to the truth of one universal force we not only lift science from the mire, but we do for the scientific world that which the doctrine of one God did for the religious world.

Prof. Wm. H. Preece, London's leading electrician, declares that, "All physical phenomena, without a single exception, may be traced to the mere transformation of electrical energy." That is a reassertion of the great Aristotelean truth, and is in harmony with my views as to the physical forces. There is but one physical force, and that force is electricity, or matter in motion, Its origin is found in the condensations of the diffused matter of space. As this ether of space condenses into the solid bodies, as the meteors, comets, asteroids, moons, planets and the cluster of stars, it is, by these condensations, caused to converge toward these common centers in straight lines, and after moving through them depositing its grosser materials radiates to other bodies, gathering more matter in space. This movement of that which has been called ether of space, constitutes all there is of electricity, and of force, and is the basis of meteorological theories. Electricity is the universal force, is the cause of light, heat, magnetism, attraction repulsion, gravitation, earthquakes, the high and low barometors, heat in the earth, volcanoes and is the life principle of the vegetable and animal kingdoms. It moves the atmosphere: lifts the moisture and is the force of the tornado Every heavenly body, from meteors to the suns, have grown from atoms by condensation. Suns and planets are caused to revolve on their axes by the electrical force we see in the natural magnet and planets and satellites revolve around their primaries, because of the elements that surround and revolve with the latter. The sun is not and the earth never was a hot body, neither light nor heat comes from the sun, but are effects of electrical radiation, the planets, satellites and asteorids entered our solar system as comets, and each will continue to grow by accumulations from the ether of space, electricity, till it becomes a sun and the center of a solar system. The earth's diameter at its equator is greater than at its poles, because of vegetable and coral growths. Coal is not of vegetable origin. The moon is not a dead world.

All storms are whirlwinds, and north of

latitude 30 they move entirely around the earth, never die, and they increase and decrease in force by reason of the position of the sun, moon and planets. The high and low barometers constitute electric pairs and the currents of electricity rise in the low, comes down in the high, forming electric circuits. Cold waves, early fall and late spring and frosts are caused by tropical hurricanes. Early springs, late falls, cold and warm winters, drouth, rain belts, excessive heat, extreme cold, great storm periods and the location of storms, are governed by the position of the planets.

Each of these affirmative propositions will require careful arguments and illustration, and besides giving weekly weather forecasts for all parts of the United States east of the Rocky Mountains, I will in my weekly letter, discuss the propositions stated above and endeavor to establish their truth.

Written for the Scientist.

"Salton Lake."

By Warren Watson.

The editor of the Scientist has requested me to furnish some observations concerning that recent lacustrine phenomenon in southern California, now known as Salton Lake. My visit to the region was so brief and my examination so unscientific that I do not feel that I have much to relate which will add anything to what is already found in print, yet as there are very contradictory views extant as to the nature, origin, and permanence of this lake, it will do no harm, at least, to state what I saw and heard as to these particulars.

The basin, heretofore, named on maps, "Dry Lake," in which the new lake has been formed, is depressed in its lowest part over 300 feet below sea level and lies between ridges of hills composed mostly of decomposed red sandstone. Its longest axis extends north east and south west perhaps 150 miles, and its width reaches in places about 30 miles. The lowest portion of the depression has frequently been covered with a few inches of water, in very wet seasons, by the drainage from the surrounding hills, but the water hardly stands longer than a few weeks on the porous soil and under a hot and thirsty sun. The last season is the first in the memory of man that the reservoir has assumed a genuine lacustrine character. But it is evident from the superficial examination that in the remote past the basin was filled with water, either from the inflow of the Colorado river or by reason of its forming a portion of the Californian gulf. If a lake, it was certainly saline, for the surface of the plain is covered with a layer of salt, in some places so pure and white and plentiful as to resemble snow. The dazzling rays of the sun make it painful to gaze longer than a few moments at the landscape without resting the eyes, and no vegetation can be seen except scattered clumps of a gray and leafless weed. It is difficult to understand how a depression so close to the sea and to a great river, and which at one time received water from one or the other, should have lost its vast flood and become a barren desert, especially as nothing but banks of sand are interposed between. Certainly no cataclysm, upheaving mountains or throwing down the earth's surface can be said to have accomplished the phenomenon in this instance. More likely it is that the deposit of sand by the river and the sea and the action of the wind in arranging it in long dykes (such as may be seen on the Southern Pacific west of Fort Yuma,) finally brought about the condition of things existing prior to the recent crevasse in the banks of the Colorado.

For it is now beyond dispute that the inflow into the lake comes from the Colorado river. Some years ago it was discovered that a dry slough, or bayon, which sometimes contained water after a heavy rain, extended from this basin in the direction of the river, and actually approached its banks about 75 miles from the Gulf. It was named "New River." Between the southern end of this

slough and the water of the river nothing was interposed but a low dyke of sand, but no one seemed to suspect that if this dyke was broken through the water would flow into the basin. It was rather supposed that New River was a dried up tributary of the Colorado. Therefore it was that so much astonishment was occasioned when the Colorado, during the extraordinary flood of this year, rose above the barrier of sand and, bursting through it, just as the Mississippi breaks through its levees sometimes, found its old right-of-way into the basin of Dry Lake, through New River. I conversed with a man, —of the genus cow boy— who claimed to have visited this crevasse and he stated to me that at the point where it occurs the bed of the river is but a few inches above tide-water and that not only the water of the Colorado, but that of the ocean also flows into Salton Lake at high tide. He accounted in this way for the saline nature of the lake. This is the general opinion among the inhabitants, so much so that I was told that applications had already been sent to Washington by several persons seeking appointment as collector of the port, pilot, etc, the authorities being informed that vessels can soon sail into Salton Lake from the ocean.

As to the permanence of the lake there seems no question in the locality. The water is constantly rising, slowly it is true, but progressively. It is now 60 or 70 miles in length by 5 to 20 miles in width, and perhaps 35 feet deep in the deepest part. Before it reaches the ocean level itmust still rise at least 275 feet and spread over an area of plain that will make it larger than Great Salt Lake. During the ensuing winter the water pouring through New River will be augmented by the drainage from the surrounding region and I predict that by May 1st next, the lake shore will be much closer to the railroad tracks than at present, it approaches now within 500 yards. Of course if anything occurs to again raise the sand dune between the Colorado and the lake, the latter will soon sink away into the earth or evapoate into the air.

Jefferson City, Mo., Sept. 31, 1891.

Governor David R. Francis,

Chairman Board of Managers,

Bureau of Geology and Mines.

DEAR SIR:I have the honor to submit, herewith, a statement of the operations of the Geological Survey during the past month of August.

Examinations of the zinc and lead deposits have been extended into Greene, Stone, Webster, Howell, Oregon, Carter, Texas, Wright and Shannon counties. Inspections of iron ores have been made in Cape Girardeau, Bollinger, Wayne, Stoddard, Reynolds, Carter, Ripley, Shannon and Howell counties. Detailed mapping has been prosecuted in Macon, Charlton and Henry counties and about 70 square miles have been covered. The study of the Quarternary deposits has been continued over the central portion of the State adjacent to the Missouri river. The mapping of the crystalline rocks has been continued in Madison, St. Francois, Washington, Iron and Reynolds counties, as has also the geological mapping in Greene county. For the purpose of constructing models illustrating the condition of occurrence of our ore bodies, detailed surveys have been completed of two important iron deposits

In the laboratory, analyses have been made of clays and iron ores. In the office the plotting of maps preparatory to publication has proceeded uninterruptedly, and work has been continued on the preparation of the report on paleontology.

With reference to future work, steps have been taken towards securing for the State, the determination of the latitude and longitude of a series of points, which determinations are necessary for the further prosecution of the detailed mapping now in progress.

Sickness of several members during the past month has materially retarded the work.

Very respectfully yours,

ARTHUR WINSLOW.

State Geologist.

The Scientist.

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Entered at Kansas City, Mo., for transmission through the mails at second class rates.

KANSAS CITY, SEPTEMBER, 1891.

A Monthly Journal, devoted to all branches of

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The Academy of Science Pub. Co.,
Publishers and Proprietors,
Kansas City, - - Missouri.
R. B. Trouslot, Editor.
Associates: Joseph Sharp, M. D., E. Butts, David H. Todd and Sid. J. Hare.

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New Fossils.

An advance sheet from the 17th report of the Geological Survey of the State of Indiana just received, contains descriptions of many new fossils found in Missouri, four species found at Kansas City, by Sid J. Hare have been named in honor of him; they are Eupachycrinus harii, Pleurotomaria harii, Orthoceras harii and Schizodus harii. This adds four more species to our list of K. C. fossils.

The Public Health Association.

The American Public Health Association, including the territory of the United States Canada and Mexico, will hold its 19th Annual Meeting at Kansas City, Mo., and Kansas City, Kans., during October 20th to 23d inclusive.

The following topics have been selected by the committee for consideration.

(1.) Sanitary construction in house architecture

(2.) Railroad sanitation,

(3.) Meat supplies,

(4.) Milk supplies of cities,

(5.) Arsenical papers and frabrics,

(6.) Isolated hospitals for infectious diseases in Cities

Dr. E. R. Lewis, of Kansas City, Mo., has charge of local arrangements and under his management, no doubt the meeting will be one of considerable importance.

The Inter-State Fair.

The Annual Inter State Fair and Exposition will be held on the grounds of the Exposition Driving Park, Kansas City, Mo., October 3rd to the 11th 1891. $30,000 in premiums have been offered,

The Natural History department will be in charge of Hon. Sevi Chubbock of Columbia.

Premiums to the amount of $146 and three diplomas are offered in the department.

The following are some of the objects on

which premiums are offered:

Best and greatest variety of birds, by taxidermist; best botanical collection; best entomological collection, best collection geological and mineralogy of the West, best collection mineral ores, best collection shells, best collection natural woods.

It is to be hoped that this department will be well represented as it is of interest, and general profit to the public.

Written for the Scientist.

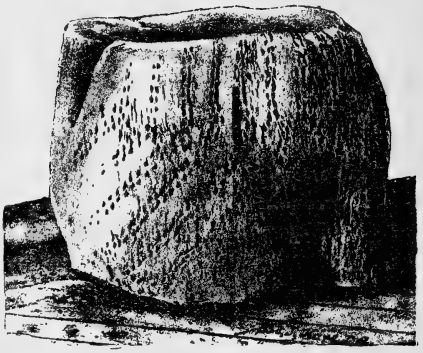
By Edwin Walters.

Mammoth Sigillaria.

In township 24 south, and range 13 east, in Souther Kansas, is an interesting field for the geologist. Here are several thousand acres of land, in the counties of Greenwood and Woodson, that abound in gigantic sigillaria. The field extends from three to five miles east of the village of Virgil, and is centrally about twenty miles southwest of Burlington. It extends for possibly three or four miles in a northeasterly and southwesterly direction. The best specimens of this fossil fern can probably be found along the bluffs of the west fork of Dry Creek.

The field consists mainly of a high, broken somewhat sandy prairie. Along Dry Creek is a narrow belt of stunted timber, consisting, for the most part, of post oaks and "blackjacks." Although nearly on the top of the high divide that forms the watershed between the Verdigris and Neosho rivers, the soil is generally black. I have seen no analysis of this soil, but believe its color is largely attributable to vegetable carbon derived from the remains of the immense forests of endogenous plants that grew and decayed in the neighborhood.

The geological horizon of these sigillaria is rather sharply defined. It is in the upper carboniferous period about 150 feet below the bottom of the permian. Much of Greenwood, Woodson, Coffey and Wilson counties is on the horizon. The particular formation in which these plant remains are found consists of a yellow or yellowish brown sandstone that varies from twenty to eighty nine feet in thickness. In this particular field, the sandstone is laminated in places, and, in others, much decomposed. The specimens themselves consist of sandstone casts, the material being the same as the above described sandstone which formed their matrix. They are now almost always found detached from the bedrock.



The figure presented herewith will give an idea of the beauties of these specimens. The one here represented is, so far as I know, the best specimen ever found in the locality.

It was discovered by myself something over twenty years ago, while chasing a runaway Texas steer In September, 188°, T. J. Tidswell, of Independence, Mo., Sid. J. Hare, now of the Academy, and myself visited the neighborhood expressly to obtain this specimen. I had given such a glowing description of it that these gentlemen, with the instincts of true scientists, were as ready to procure it as I was myself. They both became very enthusiastic when they reached the field, and we, with some difficulty, had found the specimen which had lain, for all the long years since I had last seen it, undisturbed.

There is a railroad now at Virgil, four miles west of the place, but at that time it was the work of two days for all of us

and a good helper with a team to excavate, load and transport the specimen to Toronto, a distance of about fifteen miles.

This specimen is 32 inches in height and 36 inches in diameter and weighs almost a ton. There are other specimens in the locality that are much larger than this one. Unfortunately, these larger ones are much eroded or weathered. They do not show the leaf scars distinctly, and consequently, are not so valuable as the one described above. The largest cast I remember measuring was 63 inches in diameter. The particular layer of the above described sandstone that contains the specimens is probably not more than twenty feet in thickness. At the croppings of this layer, throughout the entire field, the specimens are plentiful but have the defects already noted.

It would be interesting to excavate on the faces of these croppings to determine the condition of the specimens beneath the surface. If found in good condition, enough could be had to supply all the museums and collectors in the world.

I have never seen a description of a larger sigillaria than this field affords.

Nova Scotia, England and Pennsylvania have produced some very large specimens but so far as I can ascertain, none of them equal in size these Kansas specimens.

The above specimen that was procured by Messrs Tidswell, Hare and myself was sold to Prof, F. H. Snow of the Kansas University, at Lawrence, and now may be seen at Snow Hall.

This particular specimen has a peculiarity that may solve an important problem in paleontology. It was a stump. The crown is fairly well defined. Above the crown, the leaf stria are parallel to the axis of the trunk or stem of the plant. Below the crown the striae are arranged in spiral lines. The leaves probably grow a distance below the crown, I have seen specimens like this one is above the crown figured as sigillaria, others like this below the crown that were figured as stigmaria. Does not this specimen prove that the so called stigmaria is nothing but the roots of the sigillaria?

There is another reason why these Kansas specimens are interesting. They afford us one and possibly more, new species. I sent a small specimen of this sigillaria to Prof. J. D. Dana of Yale College. It weighed about 309 pounds and was 17 inches in diameter. It did not show the spiral arrangement of striae, but was otherwise, as well as I can remember, like the one furnished Prof. Snow. At the end of some eighteen months, Prof. Dana wrote me as follows:

"You have suggested that the fine specimen of sigillaria which you were kind enough to send me some months ago is S.—reniformus I have not been able to determine the species, but think you are incorrect. As soon as Dr. Newberry returns from Europe. I hope to refer the matter to him. It is an unusually interesting specimen, and I have it mounted in my lecture room."

If the species has ever been determined by Dr. Newberry, Professors Dana, Snow, or any other, I have never been notified of it.

There are two more phenomena in connection with this field that are worthy of note. First the horizon is geologically high for coal flora. The remains of coal plants may be found on high horizon all over the upper carboniferuous and permo, carboniferious fields of southern Kansas. Near the head of Spring Creek in Greeewood County, at the foot of Flint Hills, may be found beautiful specimens of lepidodendron within seventy feet geologically, of the Permian rocks. Near this same horizon is a vein of coal that is thick enough in some neighborhoods to be workable.

The sandstone in which the sigillaria are found yields, in other neighborhoods, calamites, equisitae and other coal measure fossils, but so far as I have observed no great specimens of sigillaria

The second phenomenon is the fact that these gigantic coal plants grew so far above the true coal measures.

The thin vein of coal mentioned above and another the one that lies about the same

distance, 80 feet, below the sigillaria are all the known veins of coal to a depth of nearly 1000 feet.

No prospecting for coal at great depths has been done in the field except one boring made on the VanHorn or Felker ranch. This failed to penetrate coal. As well as I remember, this boring was about 400 feet deep. Thirty miles distant at Fall River, and on nearly the same geological horizon, I superintended a boring that was put down to a depth of 936 feet, and it penetrated but one thin vein of coal. At Reece about thirtyfive miles west, a boring was made on a horizon about 125 feet higher, nearly on the dividing line between the upper Carboniferous and Permian rocks. It was sunk, as shown by the record kept, to a depth of 800 feet. No coal of any importance was struck, in fact none except that on the two horizons mentioned above.

I have been enabled to identify the lower coal horizon, mentioned above, by its proximity to a persistent formation of shale that contains great numbers of fossil shells, mostly myalina sub-quadrata with an occasional m.— recurvorostris.

This coal horizon affords most of the workable coal in Osage county, Kansas The horizon extends through Lyon county and into Greenwood, being well defined six miles west of Madison, fifteen miles south of Emporia.

I have endeavored to trace the upper layer of coal, mentioned above, by its proximity to a limestone that is very rich in the little wheat, grain-like fossils, fusilina robusta and F.—cylindricus. but have found the attempts only partially successful on account of the lack of perfect persistency of the part on my datum. the last mentioned limestone.

On the west side of this sigillaria field and in a lower layer of the sandstone can be found some beautiful prints or impressions of fern leaves. Some of these impressions are four or five feet long. The venation and serration are nearly perfect. There are several species. Among them are the wide spread pecopteris and polypodium. The largest impressions are probably of the genus felix. These fern prints may be found in the bed of Sharp Branch from Virgil easterly to the sigillaria field. They are more or less plentiful from this neighborhood, in a southerly direction on the sandstone horizon, for thirty miles. On the Hunt farm near Charleston in Greenwood county are some very fine fern impressions. These impressions are all in hard, ferruginous, sandstone.

On this same horizon, my little daughter, five years old, discovered a fine specimen of sterbergia which she exchanged with Mr. A. C. Austin of this city.

The readers of the SCIENTIST must not get the impression that valuable o sils specimens can be found in the greatest profusion in this sigillaria field by simply making a hurried survey of the surface. Such is not the case. Specimens must be searched for here as elsewhere. It is true there are train loads of sigillaria, but good specimens are comparatively scarce for reasons given above. Notwithstanding this, the industrious collector need not fail in this splendid field where the ferns once grew to a height of 100 feet and attained a diameter of possibly six feet.

Literary Notes.

In the popular Science Monthly for October, Hon. Carroll D. Wright will begin a series of papers under the title Lessons from the Census.

The series of articles on American Industries will be continued with a fully illustrated account of the manufacture of steel, by William F. Durfee, giving the history of the industry from colonial times to the introduction of the Bessemer process.

Prof. A E. Dolbear will contribute an essay on Metamorphoses in Education. It is a thoughtful paper.

The Rivalry of the Higher Senses is the title of a paper by Prof. G. T. W. Patrick, to appear also. It points out how greatly we differ from the ancients in receiving most of our information through

the eye while they took in theirs more largely through the ear. Some of the consequences of this change are also noted.

The second of Prof. Frederick Starr's articles on Dress and Adornment, will be published in the October number. The author maintains that dress arose from a desire for ornament rather than from a sense of shame. He describes a number of beautiful garments that are made by savages, and illustrates his descriptions with a large number of pictures.

Book Reviews.

The second quarterly number of the XIV Volume of the Journal of the Cincinnati Society of Natural History has been received. It contains the proceedings of the monthly meetings, donations to Cabinet and Library, and reports of the officers of the society. It also contains two interesting papers, the first "On the age of the Mt Pleasant, Ohio, beds" by Prof. Joseph F. James: the second paper is a list of the birds of Warren Co., Ohio, by Raymond W. Smith. h first paper is nicely illustrated by four photo engravings. The second paper classifies the birds, and gives many notes which will be of interest to the Ornithologist of that section of the country.

The Chautauquan for October has several illustrated articles and the portraits of a number of prominent women.

It has a well written article on "National Agencies for Scientific Research" by Maj. J. W. Powell, Ph. D. LL. D.

Science the handmaid of Agriculture, by George William Hill contains many well digested thoughts.

Social Science in Society is presented by John Habberton.

Dr. McG Means explains Land Tenure in the United States and how it differs from that of England.

Edward Everett Hale, the ever popular historian begins his first paper on "The Domestic and Social Life of the Colonies.

J. C. Ridpath too well known as a historian to need further comment, has an article on "Battle of Bunker Hill.

The editor, in speaking of the death of James Russell Lowell says truly, his death will be felt wherever the English Language is read. In America and in England, he was esteemed by the best minds both as a man and as a writer. He made friends among those whom it is an honor to know, by a personal attraction peculiarly rare and fine and by his literature, he set himself among the few who wrote what is worthy of preservation.

It is too soon to predict the effect of his work upon American life and thought yet he has been a notable figure for the past forty five years in our arena of intellectual activities. Poet, essayist, critic, publicist, editor, college professor, minister to the court of St. James and to the Spanish court, he made a splendid reputation for himself in whatever line he worked.

Lowell's nobility of character and his acute sense of personal responsibility made him a notable figure in higher fields of American politics. In Europe, as the representative of our government, he won the esteem of the greatest men of the time.

He was influential in procuring the present copyright law subject. In this as in everything else that he advocated, he took the highest moral ground, demanding the fullest and freest recognition of absolute property in literary products.

The Chautauquan is a great educational factor in this, so called "Woman's age" and is elevating the aims and general standard of women, more than any other magazine published today and is a great aid to the "sterner sex" as well, educating hundreds of young men all over the land.

A Description of a New Species of Echinodermata From the Upper Coal Measuros of Kansas City.

By E. Butts.

Aesiocrinus lykinsi, n. sp.

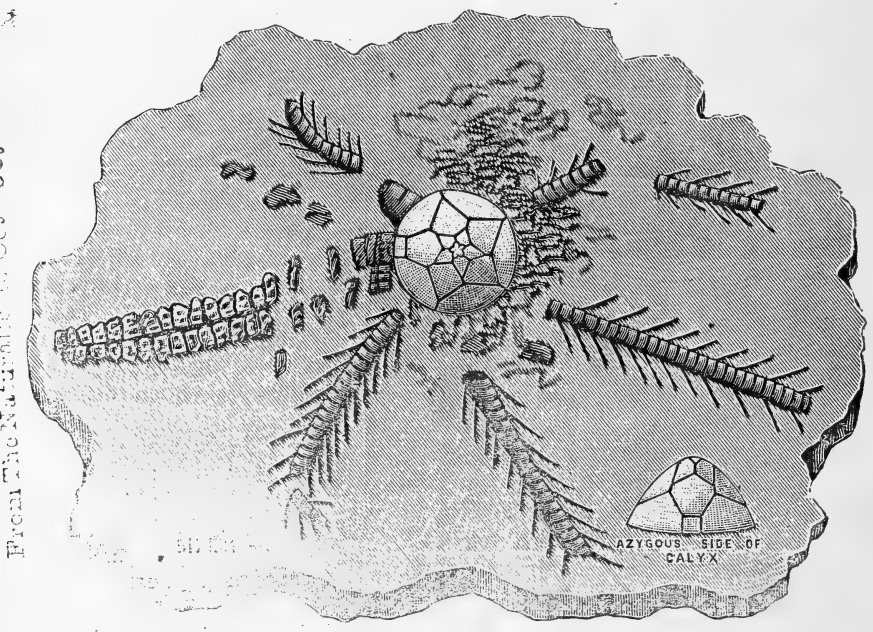
This species has a paraboliform calyx; surface of plates smooth; sutures not indented; column decagonal with curved intersections; basals five in number and of hexagonal form; they are consideably bent up and measure from tip to tip about four times the diameter of the column.

The subradials are comparatively large, having somewhat more width than heighth, four of them are hexagonal and one heptagonal; these are very slightly curved, appearing nearly tangential to the basals. The upper sides are about one-third longer than the lower sides, and about five times the length of the end.

The first radials are considerably larger than the subradials, and all are pentagonal; the distance across the top of the first radials is greater than it is at the intermediate angle, which, with the width of the subradials is the cause of the pyramidial form of the calyx.

There is one azygous plate resting between two of the first radials and on top of the heptagonial subradial, which is quadrangular, the upper side of this plate being slightly longer than the lower.

The probosis, tentacles and cilia are the same as A. *magnificus*, from which species it may be distinguished by having no vertical plates in the calyx, also the great width of the subradials, and also the basals being much longer and curved upwards; these are likewise its variance with any other known species of this genus.



It was found in the upper coal measures at the corner of Tenth street and Baltimore avenue in Kansas City, Mo. in the Blue Shale known as Rock No. 97.

This species is here first described and is named in honor of one of our earliest local workers in Palalontology, Mr. W. H. R Lykins.

Kansas City Medical College.

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The Twenty Third Annual Session will begin Oct. 6th, 1891. Commencement, March 15th, 1892. Three Years graded course. For particulars address:

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THE KANSAS CITY

SCIENTIST

ASTRONOMY. GEOLOGY. PHILOSOPHY. MINERALOGY. BOTANY. METEOROLOGY. ARCHÆOLOGY. ZOOLOGY. MECHANICS.

Official Organ of the Kansas City Academy of Science.

VOL. V. KANSAS CITY, MO., OCTOBER 1891. NO. 10

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KANSAS CITY, MO.,
ACADEMY OF SCIENCE PUB. CO.,
Publishers.

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Lewis Lindsey Dyche. A. M., M. S. Kansas State University, Lawrence, Kans.

Compiled by E. T. Keim and R. B. Trouslot.

Not long ago we boarded the Santa Fe Express, and after a short but pleasant ride, swung off at Lawrence, Kans., a prosperous city of over 10,000 population and the county seat of Douglas county.

Here is located one of the many thriving educational institutions of which Kansas is so justly proud, the University of Kansas, now entering its twenty-sixth year of activity.

The limited space will not permit an extended account of all the buildings and surroundings, nor will it allow us to even mention half of the wonderful things seen during a brief stay of only a few hours. We wish it had been days instead of hours. The special object of this visit was to meet Prof. L. L. Dyche, and to examine, personally, his taxidermal work, of which so much has been published in both Kansas and Missouri papers, they evidently vieing with one another to do the young, but skillful Taxidermist honor.

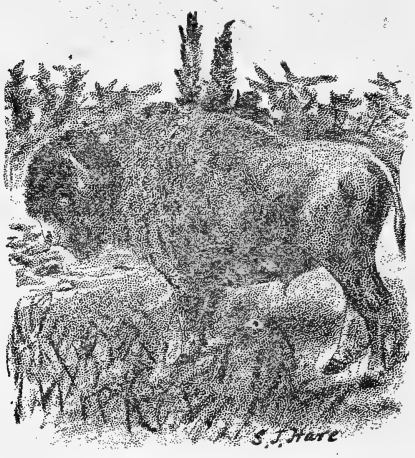
Having had fifteen years experience in all branches of Taxidermy, we speak advisedly

Prof. Lewis Lindsey Dyche.

when we say it is an easy matter for most any one to "stuff" a bird or animal, but quite difficult to attain any considerable skill in this line of work, and it is hardly probable that any given period should produce

more than one really great taxidermist. To be such requires perfect familiarty with the anatomical structure of the various animals to be treated, and a careful study of their movements in their native haunts.

Lewis Lindsey Dyche was born at Berkley



Buffalo, University, Museum.

Springs, Morgan County, W. Va., March 20, 1857. When scarcely five weeks old, his father, Alexander Dyche, removed to Osage County, Kansas, and by thrift and that indomitable will. so fully developed in his gifted son, achieved a full share of success. In that early day the only human beings seen were the Indians, save an occasional train of wagons on the old Santa Fe wagon trail, which passed near the farm. The child's earliest recollections were vivid with pictures of wild Indians, howling wolves, buffalo, deer, and countless other animals, drawn there by abundance of food and convenient shelter.

Wild turkeys and prarie chickens abounded everywhere. Some idea of their abundance may be gained when it is stated that Prof. Dyche's father shot two dozen one winter's morning from some elm trees near the house.

The stirring events of these pioneer days served to bring out and intensify those characteristics, which have since carried Prof. Dyche by sheer pluck and perseverance up to that enviable position he now holds among the leading Naturalists of the world.

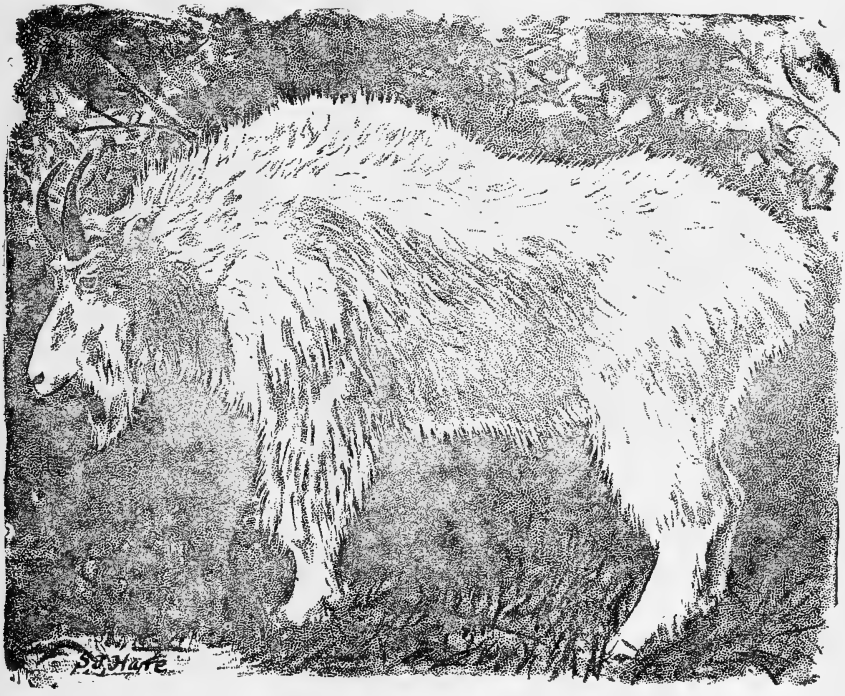
We now recall a most vivid account of a destructive prairie fire, a most common occurence before the country was fully settled, which was related to us by Prof. Dyche as follows.

The whole country was swept clean at one burning. We all stood in mortal terror of that dreadful day when the country would "burn off," as the phrase went. On one occasion, I remember seeing father fight fire until I thought he would drop dead. Of course farms and houses were protected by plowing around them and burning wide fire "breaks" as they were called. But the high wind would sometimes carry the fire by blowing, burning, tumbling weeds etc. incredible distances. It was on an occasion

Group of Mountain Goats, (Mazama Montana,) as mounted in Kansas State University.

of this kind when father fought so hard to save his fences and hay. At the last moment the fire broke over near the wheat stacks Father hastened to the spot, dragging me with him, as well as a piece of old wet blanket. He made a last desperate effort to save his wheat. He moved me two or three

times to keep me out of the fire. I can see him yet pounding the fire with that old blanket. He finally conquered the flames but the fire burnt up to the very edge of the stack. Father (who is a large man, over six feet tall and who never had a sick day, and never knew his real strength) was soaking wet with perspiration and so completely exhausted by the heat of the fire and that of over exertion that he could not stand up. It was a dreadful hour for me. I have been in a cyclone, but its phenomena could not



Old Male Goat, (Mazama, Montana.)

begin to compare with those of that occasion."

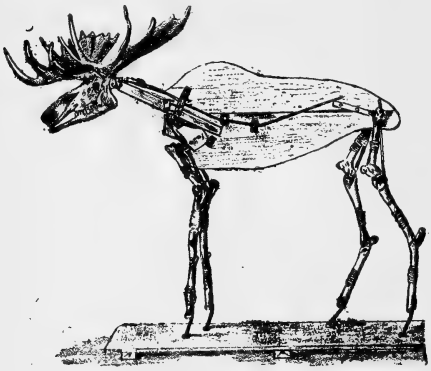
Under the then existing conditions no facilities for acquiring even the rudiments of an education were at hand, and at the age of thirteen the future Naturalist had studied only from the book of nature and was wholly ignorant of the alphabet, but that his mind observed every passing event, is shown by his accurate knowledge of the habits of the fauna in his neighborhood.

At the age of sixteen Prof. Dyche began earnestly and steadfastly to acquire that broad and thorough course of learning which is so brilliantly reflected in his earnest words and manner, together with those enduring monuments to his skill in the hundreds of mounted specimens of birds and animals in the University Museum

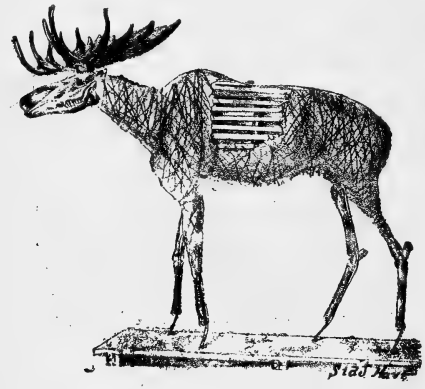
Like the lives of many of our successful men, the developing of this Anatomist and Taxidermist was largely due to his mentor who in this case was Mrs. A. P. Morse, who saw in the rough untutored country boy, the germs of the coming Scientist, and by judicious praise she inspired her pupil to push forward and predicted the success which has so signally crowned his work. This accomplished lady's efforts were afterwards seconded by Prof. Snow, Chancellor of the University.

Prof. Dyche completed both the classical

and the scientific course of study in the University and received the degree of B. A. and B. S. in 1884, and in 1886 took the degree of M. A. for two years special work in English Literature. In 1888 he received the degree of M. S. for special work in Natural Science. Prof. Dyche has not written much for publication, but a recital of his active life will give an indication of the matter that is being gathered together, by work in the school and laboratory, supplemented by extensive travel. Fourteen trips have been taken for natural history specimens, ranging over the country from Mexico to Alaska and British Columbia, the duration of the trips varying from one to six months.



The Frame Work of Wood, Iron and Bone.

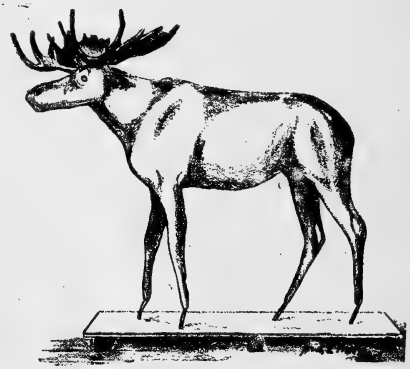


Statue Partly Completed.

A most important feature of Prof. Dyche's work is the collecting and "setting up" of large mammals, indigenous to American soil, which are being swept off the face of the earth with such astonishing rapidity that the coming generation must study Buffalo, Moose Caribou, Elk, Rocky Mountain Goat and others from museum specimens.

Winding on the Excelsior.

Since 1884 in addition to teaching and the overseeing of the Laboratory, Prof. Dyche has mounted six hundred birds and over fifty mammals, thirty of which range in size from a deer to a buffalo or moose. He has also collected numerous skins of birds, large and small mammals, and in the storeroom can be seen a great number of specimens, labeled and catalogued, among them are nearly three hundred skulls with accompanying leg bon



The Completed Statue, Ready for the Skin.

and skins of mammals in size from a fox to that of a moose, elk and buffalo, also some twenty complete skeletons of large mammals most of which have been collected and prepared by Prof. Dyche. These specimens include series of skins of such animals as the buffalo, moose, elk, mountain sheep, mountain goat,, antelope, caribou, virginia and mule deer, bear, grisley and black, mountain lions, wolves and coyotes, lynxes and wild cats, and various species of

The finished specimen, Cervus Alces American Moose.

foxes including one splendid silver gray, etc. Of the smaller species of mammals there are series of skins such as beaver, otter, wolverine, fisher, martin, mink, badger, woodchuck, swift, skunk, etc.

Prof. Dyche has prepared six hundred pages of anatomical notes and measurements which describe the specimens above mentioned. These notes will form the basis of a series of scientific papers which will appear in the future. Prof. Dyche's leisure moments are occupied in writing a book, entitled "Camp Fires of a Naturalist." It will be a book for "boys" both old and young, a book for all lovers of nature, particularly young Naturalists and sportsmen. It will be an account of Prof. Dyche's trips, with Natural History science, worked up in a readable and popular style. Prof. Dyche is also collecting material for monographs of some of our American Mammals.

In 1889 the chair of Anatomy and Physiology was created and placed under Prof. Dyche's direction, with one assistant to help with taxidermic and museum work.

In 1890 the Board of Regents requested Prof. Dyche to assume charge of the work in Zoology and Animal Histology with one assistant; this has been increased to four and the Board has promised another.

A recent copy of the Daily Record, Lawrence, Kans., gives an account of Prof. Dyhce's elaborate preparation for the exhibition of Mammals at the World's Fair. The article states that the exhibit will consist of twenty groups, mounted and prepared in a manner far superior to those ordinarily employed, They will be labeled and classified so as to preclude the possibility of the most careless observer mistaking their significance.

Judging from the past, it is but a reasonable prophecy that Prof. Dyche will contribute largely towards formulating and establishing a broader view of the life and habits of North American animals, and then take rank amongst the greatest of living Naturalists.

Mr. Dyche had just retured from an elk hunt, when he received a despatch calling him to Fort Riley, to take charge of the horse "Comanche" the only animal which survived the Custer massacre; he was twenty-nine years old. Prof. Dyche has the hide and skeliton, which he will mount and have at the World's Fair with the Kansas collection.

Proceed ngs of the Academy of Science.

The Human Mechanism.

By. Joseph Sharp, M. D.

No doubt to consider man as a machine is on the first thought, a shock to our higher intelligence. Abhorrent to a certain degree to our consciousness, that part of us that has recently been designated, as "simply the part perhaps of an outer concentric Psecychic circle; the rest of circumference of which we could never know," However we all readily admit that the economic value of a man, depends entirely on what and how much he does in a given time. In other words it is his "mechanical daily duty," the product of three quantities, the effort the velocity and the number of units of time per day during which work is continued." Certainly just the estimate we would put upon the utility of a machine.

Let us consider the theory of machines as set forth in the article on Applied Mechanics in the Encyclopedia Britanica and see in how far it applies to the human Mechanism. First, the parts of a machine consist of the frame and mechanism. In considering the frame the stability and the stiffness and strength of the frame and mechanism are of primary importance. In considering the machine in motion, we naturally take up the question in the following order. First, some natural source of energy communicates motion and force to a piece or pieces of the mechanism called the receiver of power or prime mover.

Secondly, the motion or force are transmitted from the prime mover through the train of mechanism to the working piece or pieces and during the transmission the motion and force are modified in amount and direction, so as to be rendered suitable for the purpose for which they are to be applied.

Thirdly, the working piece or pieces by their motion, or by their motion and force combined produce some useful effect. This is considering the phenomena of machines in the order of causation. While for simplicity's sake probably, the order adopted by the above named writer is the best, that is first the modification of motion and force by the train of mechanism, second, the effect or purpose of the machine, and last, the action of the prime mover. Giving the following classification:

I. Pure mechanism under which we have, motion of a point, 2, motion of the surface of a fluid, 3, motion of a rigid solid. 4, motion of a pair of pieces, 5, motion of a train of pieces, 6, motions of sets of two or more connected pieces or an aggregate combination.

II Applied Dynamics, under which comes 1, balanced forces, 2, deflecting forces. 3, working of machines of varying velocity.

III. Purposes and effects of machines. 1, observing machines, (a) counting machines, (b) measuring machines, (c) copying and drawing machines, (d) weighing machines, (e) recording machines, 2, working machines, (a) lifting and lowering solids, (b) horizontal transportations, (c)projecting solids, (d) lifting fluids, (e) propelling or projecting fluids, (f)dividing bodies, (g) shaping by removal of a part of these machines, (h) uniting into fabric machines, (i)sound producing machines, (j) miscellaneous machines.

IV. Applied enegetics or theory of prime movers, under which we have, 1; prime movers in general efficiency. The useful work ofthe prime mover is the energy exerted on the piece it directly drives and the ratio which this bears to the source of energy is the efficiency. 2; source of energy, (a) strength of animals (b) weight of liquids, (c) motion of fluids (d) heat, (electricty and magnetism.)

Following this classification, let us then look at the human mechanism.

First the construction claims attention and admiration. The frame is made up of a central axis, the spinal column, consistingof a number of light compact pieces adjusted in curves with pads or bumpers between to lessen shock, it is adjustable in every direction. From this central axis there are developed out in two direction arches, haematic and neural, to give support and protection to the working parts of the mechanism.

At the top when the body is erect the working position the neural arches are expanded into broad plates, supporting and protecting the observing and governing apparatus of the mechanism the brain and medulla obongata while haematic arches of the same, are expanded and arranged to do like service for the receiving apparatus, for sound, light taste and smell impressions and to support the smoke stack, fresh air inlet, the nose fuel receiv r the mouth and the sound making apparatus, vocal cords and larynx. Below these pieces of the axis, the neural arches protect the apparatus adjusting and protecting the various parts of the machine, the spinal column, while the haematic arches develop into a series of over lapping arches to support and protect the blast apparatus, lungs, the fuel preparation, mechanism the stomach, liver, pancreas and small intestines and the central engine of the hydrolic apparatus, the heart. To the upper part of these arches and developed from them are long working levers, the upper extremities. Below these pieces the haematic arches are expanded to protect the cinder box, the rectum and large bowells, the ash receiver, the bladder the model making apparatus, the reproductive organs. And from this end of the central axis, and as appendages to these arches we have another set of working levers, the lower extremities.

In this outline of the construction we will not enter into bewildering details but only call attention to the simplicity of plan and wide adaptability, and fitness to ends.

The second consideration in the frame is the material, strength and stiffness.

In material we again have extreme simplicity. The frame is made up of 1, connective tissues, giving support to the working units, 2, epithelial cells. 3, muscular cells, 4, nervous cells. But just nowwe will consider only the material of theframe (the ge bund webe of the German) the connective tissue,

When containing a large per centage of solids 998 in 1000 parts largely inorganic it constitutes bone, which has a resistance to traction of 7.76 kilograms to the square millimeter of surfaces a resistance to pressure varying from 4.33 kilograms in the bones of the aged to 15.03 kilograms in a man of 30 years to the square millimeter, the coefficent of elasticity 2264, as compared with cast steel, having an elasticity of 19,881. This tissue with a less per centage of inorganic solids constitutes the cushion between the pieces of the frame, the ligaments binding the parts together, the elastic tissue encasing the working units, the muscle, nerve and gland cells, and the tendons that transmit force to the working pieces.

Containing fat in its meshes it acts as protecting pads in various parts of the body and under the skin, where it has the additional function of being the place of storage for reserve fuel, so that in using coal bunkers for protective armor of war ships, is only doing what has been done in the human body.

This machine in the prone posture is of the greatest stability, as probably all of you, who have ever attempted to turn or lift up a companion in a faint, or a drunken man have found from experience yet in this posture there is the greatest economy of expenditure of force necessary to maintain, the necessary resistance to gravity and other forces of na-

ture. In the erect position we have the greatest instability, with the greatest ability for adjustment to meet force from any given direction. In the voluntary muscles, we have the working parts of locomotion, in the involuntary muscles the working parts of the fuel renewal, blast and ash disposal apparatus, in the nervous system, the regulating governing. and protective apparatus, as also the observing and recording apparatus. While are the glandular tissues the active agents in modifying the food products, effete, and protective materials.

In the study of man in motion we have every phase of pure mechanics. In the curves, described by the center of gravity all the problems of the movement of a point. Motion of the surface of a fluid of a rigid solid, of a pair of pieces, of train of pieces, motion of sets of two or more connected pieces.

In the field of applied mechanism we encounter every phase of balanced forces deflecting forces, and variation of velocity.

Now as to the purpose of the machine.

We find the human mechanism serving every phase of working machines, while the recording and observing apparatus serves for adjustment not only to the present environment, but looks into the future welfare of the individual and his offspring. If intellegence is indestructible and measured by adaptibilty, then the wonderful adaptibility of the human organism must be the best evidence of the superiority of man over all animal forms.

Prof. Garner has been conducting some interesting studies in the language of the apes at the National Zoological Gardens at Washington. By using the phonograph he has succeeded in determining the sounds used by the apes signifying thirst, hunger, danger and the like at almost a dozen different expressions among themselves, all being nearly exclusive vowel formations.

Exhibit of the Kansas City Academy of Science, at the Kansas City Inter-State Fair, Oct. 3rd to 11th.

The exhibit made by the members of the Academy of Science at the fair, was one that did credit to the Academy, as well as forming one of the most attractive exhibits there.

Of the many thousands of people that attended the fair, we noticed only a few who were not interested in the Natural History department, nearly all seemed to have devoted more or less time to some branch of science. You could soon tell their hobby, for as soon as they discovered the specimens illustrating it, there they stopped and devoted their entire time to the study of them. We noticed individuals who spent hours in study and saw these persons return with their friends and show them all the rare specimens they had discovered.

We were often surprised at the knowledge displayed by the scholars of our public schools, the names and habits of the birds, as well as those of the insects seemed to be as fresh in their mind as their last lesson in history and as the cases were examined exclamations of surprise and delight always announced the discovery of some new form, or some old familiar one, There were a few from the rural districts who had evidently come in to see the fair, and from the remarks they made we learned that all people do not see just the same, The Nantilus received many names and each name referred to some object to be found on the farm, one called it a petrified rams horn, another the tail of a big petrified Lizard, while one youth with a downy moustache told his girl it was a pulverized rattle snake; evidently he meant petrified.

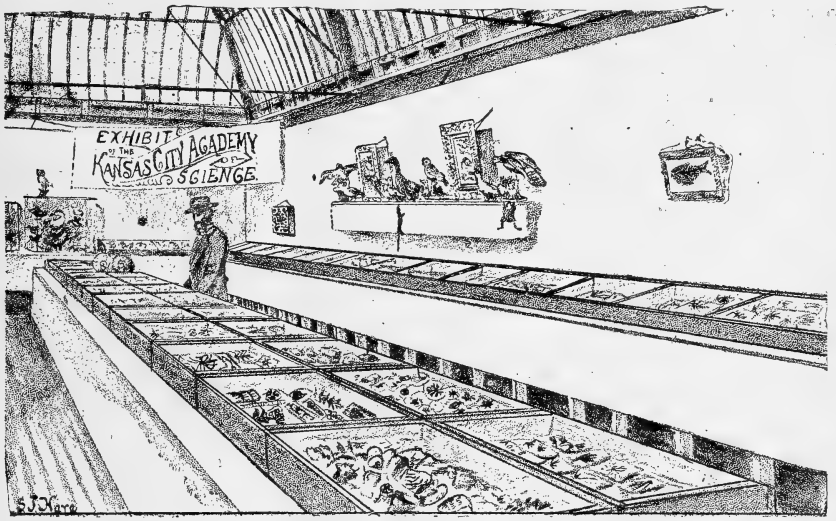
The Crinoids were wonderful and many thought they were carved, while others thought they were petrified spiders.

Most of the collection was arranged in glass cases as can be seen by the accompanying

picture, the total length of the cases was one hundred and forty-five feet. Many specimens were not unpacked for want of case room to exhibit them. The hundreds of botanical specimens were only represented by a few specimens from each collection, while nine-tenths of them were exhibited only to the judges of this department. We hope this will not be so next year as we think a liberal portion of the premiums offered should go to the Natural History department, and that proper cases and space for same should be supplied by the association.

Beginning to the right and in front of the picture was the collection of Mr. F. M. Howe, consisting of many rare crinoids from copper consisting of the capellary forms of Malachite Azurite and Cuprite were wonderful, being masses of hair-like crystals of copper in all the various forms and colors. These specimens were from a pocket recently discovered in Morenci mining district of Arizonia. These specimens are pronounced by experts, to be much finer than Lake Superior specimens.

Mr. E. Butts filled the following case with a few of the rare archaeological specimens from his large collection. Among them were the following; The noted Frog Pipe of Indiana, the beautiful Disc Pipe of Saline county, Mo., seven large flint spear points, ranging in length from eight inches to eleven inches, all found on Sugar Creek,



Kansas City, Mo., Burlington, Iowa, La-Grand, Iowa, and Crawfordsville, Ind.

Following the above was the Geological collection of Mr, D. H. Todd, consisting of many rare forms of crinoids from America and Europe, as well as a general collection of fossils, illustrating the geology of the west. Mr. Todd also made a display of Mineral Ores on which he received first premium. The many highly colored minerals attracted the attention of the least observing visitor to his department. The many specimens of

north of Independence, Mo., several fine fleshers made of highly polished hematite and granite, there were also some rare pieces of pottery taken from mounds in this state, an elk cut out of a piece of hematite, and many other rare objects, also many peculiar forms of flint points, knives, etc., also silver ornaments taken from graves in Wyandotte county, Kas. One can hardly appreciate the value of Mr. Butts collection by these few specimens, for his over crowded cases at his home would not show that a single speci–

men was missing from the thousands kept therein.

Mr. Brigham furnished the beautiful Mexican vases that were exhibited in the case ad joining Mr. Butts collection. This Aztec pottery is worthy of a better description than we can give here, and at some future time we will illustrate and describe it in full.

Mr. Antone Houston owns the collection of archaeological specimens in the following case, it gave a good idea of the archaeological specimens found in Jackson county, Mo.

The Academy collections of Minerals filled the last case on the right, and consisted of only a part of the valuable minerals of the late W. H. Byram collection, presented to the Academy by Mrs. Byram. One year ago Mr. Byram displayed this collection and also gave us valuable assistance in arranging and labeling our several exhibits.

The cases on the far end were filled with land, fresh-water. and sea shells, belonging to Mr. R. B. Trouslot, Mrs. Barzilia Gray and Sid. J. Hare.

Mr. T. Elkington filled the center of the far end with several cases of finely mounted birds which showed by their life like appearance that he is a taxidermist of remarkable skill.

To the left of the above collection was the botanical collection of Mr: B. F. Bush, of Courtney, Mo., also another belonging to the Kansas City Ladies College of Independence Mo. both of these collections deserve more space. The collection of woods were also here, there being four entries.

On the table in the center were twenty six cases, seventeen were filled with fossils picked up in and around Kansas City, these cases were arranged in the order of life, from the lowest to the highest forms, found in the Upper Coal Measures rocks, and gave one a good knowledge of the abundance of fossils found in this locality. This collection belongs to Mr. Sid. J. Hare, one of our local collectors who discovered the Kansas City crinoid bed several years ago. In his display could be seen several cases of these wonderful fossils, he also had three fine specimens of the Nantilus ponderosus weighing from thirty to fifty pounds The other nine cases were filled with fossils representing the different geological periods the crinoids especially being fine. Mr. Hare also had a collection of entomological specimens.

The collection of birds on the left were mounted by Messrs Hare, Bryant and Trouslot. The fossil fish in the frame belongs to Mr. Todd and is a fine specimen of the fish found in the Green River shales of Dakota. Mr. Todd received first premium on his collection of minerals and secoud on geological specimens. Mr. Hare received first on geological specimens, first on entomology, second on birds, and second on shells. Mr. Trouslot received first on collection of shells. The Byram collection of the academy received the second premium on minerals. Mr. B. F. Bush first on botanical specimens. The Kausas City Ladies College of Independence second on botany Mr. J. K. Lautzenhiser took the premium on collection of woods.

There was no premium offered for archaeological specimens, but the judges in this department recommended that Mr. Butts colection receive honorable mention.

We hope the Fair Association appreciated this display, as did the many thousand visitors, and in making their premium list next year will show their appreciation by offering as much in the Natural History department as they do for others of less value and interest to the public.

The mosquito is one of the most peculiar little insects known so far as its locality is concerned; they inhabit New Jersey to such an extent during the month of August that it is necessray to wear gloves with the thermometer standing at 100, or be continuously annoyed in a useless effort to drive them away. They are recorded as being a nuisance to the Artic explorers in North Greenland, and during the month of May they are as numerous on the snow banks of the Rockey Mountains at an elevation of twelve thousand feet above sea level, as at any time of the year in New Jersey.

A Sketch of William Ferrel.

By Dr. Jacob Ferrel.

About the year 1785, two brothers, Joseph and William Ferrel came from Ireland and settled in Pennsylvania. Soon afterwards Joseph went to Kentucky and gave rise to a somewhat numerous progeny that are scattered through the Western states. William remained, and in a few years died, leaving but one son. The subject of this notice was the the oldest son of this Benjamin

Ferrel, who lived at the time William was born at Col. Knable's sawmill, in Bedford county, Pa., (now Fulton.)

William Ferrel was born the 29th of January, 1817 and died Sept 18th 1891 in the 75th year of his age.

As William showed an early inclination to books his father started him to school at a very tender age, and his devotion to his studies and his proficiency in learning was soon a marvel all over the country. When William was 12 years old his father moved on a farm in Berkeley county, West Virginia, having previously been engaged in tending sawmill The facilities for education in both places were crude and unregulated both for a want of good school houses and competent teachers. Up to the age of thirteen, when William quit school, his rapid progress was made, a good part of the time, in a log school cabin, seated on slab benches before a fire in a wooden chimney, under a clapboard roo , with greased paper for window lights. Between the age of thirteen and twenty he spent the time in home study; every winter, his parents being poor, he would gather a supply of rich pine knots which he would split and use for light in his various studies till a late hour at night, every leisure moment was used during the day.

William, at the age of 16, with no mathematical literature except a few old musty volumns furnished him by the county surveyor of Berkley county, West Virginia, calculated the eclipse of the sun and moon. At 20 he began to teach school and continued in that vocation about three years. At the end of that time, having saved a little money he went as a student to Marshall College, a cheap institution, at Mercersburg, Franklin county, where he remained three years. He then spent one term at Bethany College, West Virginia, and graduated in 1844, in the first class of graduates turned out by that institution, composed of Messrs Dearborn, Stone, Bryant and Falls, all of Kentucky. Before he left Bethany, William Ferrel was tendered the chair of mathematics in that institution but for some reason he refused the honor and went to Liberty, Missouri where he remained nearly two years, teaching a common school. He then went to Allenville, Ky., and was employed to teach, at good wages, a private mathematical and classical school by Col Duffy and other wealthy planters, for the benefit of their sons whom they did not wish to send from home. It was here that William Ferrel was dubbed Professor. After remaining at Allensville a few years, through the influence of elder Jesse Ferguson, he was induced to go to Nashville, Tenn., and take charge of a high school and commercial college. While here, under the administration of President Buchanan, he received the ap-

pointment in the Nautical Almanac office to which were added at different time other appointments, such as the Geodic and Coast survey with other abstruse computation in relation to the movements of the atmosphere and the waves of the ocean, the basis of what we know about the appearance of cyclones tornadoes, whirl-winds, cloud-burst and the like. During his stay with the government, embracing a period of 36 years, William Ferrel performed much mathematical labor that is to-day greatly benifiting the scientist of the world. Since his resignation he has only furnished one work entitled "A Popular Treatise on the Winds" work of 500 pages.

William Ferrel in early manhood attached himself to the Christian church, but his mind having always been on a mathematical strain he never contributed anything to aid or oppose theological opinions, prefering to leave such questions to theologians themselves. Late in life however, I think he rather inclined to the doctrine of the Unitarians as he often attended their church rather than any other. He was possessed of a clear head, clean hands and a pure and warm heart, was charitable in a high degree, and ready to help any of his relations to a start in life. He often contributed to indigent poor on the streets of Kansas City while he lived there. In all relations of life William Ferrel was straightforward, neither deviating to the right or to the left, always unassuming, unpretending, and was as honest a man as ever lived or died. I cannot better point out his true character to your readers than I can by citing the last act of his life, which was to select so humble a resting place as that at Maywood, Kansas.

Dr. Joshua Lindahl, State geologist of Illinois, has discovered kaolin in Union county capable of producing the best quality of earthenware.

Resolutions.

Kansas City Academy of Science, Oct. 20th 1891.

Whereas: It has been the will of the Almighty to remove from our midst our fellow member and friend, Prof. William Ferrel.

Resolved: That in his death we have lost a friend, a co-worker in science, and the world one of its greatest meteorologists, our academy its first honorary member.

Resolved: That we tender our sympathy to his relatives and friends in their bereavement

Resolved: That a copy of these resolutions be printed in our official paper, along with a sketch of his life, and that copies of that issue be sent to his relatives.

Committee { Sid. J. Hare. Edwin Walters. Dr. Jos. Sharp.

The Rev. T. DeWitt Talmage is quoted as follows, the muscles of the body has 14,000 different adaptions; these are 100,000 glands, and 200,000,000 pores; the heart contracts 4,000 times every hour and 250 pounds of blood rush through it every sixty seconds; the human voice, is capable, as has been estimated, of producing 17,597,186,044,515 sounds; there are hundreds of thousands of animalcula living within a circle that could be covered with the point of a pin; animals to which a rain-drop would be an ocean and the flash of a fire-fly lasting enough to give them light for several generations.

Eliots translation of the scripture from the English to the dialect of the Algonquins, which was published in 1661, contains the following similar meaning words.

Finger—Muhkukquaitch.
Wife—Nunaumonittumwas.
Warrior—Aummenuhkesuenomoh.
Lodge—Wunneepogqukkomukqut.
Mast—Schoghonganuhtugquot

The Scientist.

FORMERLY THE NATURALIST.

Entered at Kansas City, Mo., for transmission through the mails at second class rates.

KANSAS CITY, OCTOBER, 1891.

A Monthly Journal, devoted to all branches of

SCIENCE.

The Academy of Science Pub. Co.,
Publishers and Proprietors,
Kansas City, - - Missouri.

Editors.

R B. Trouslo' Joseph Sharp, M. D., E. Butts, David H. Todd and Sid. J. Hare.

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No. 2415 East 13th St,

Correspondence.

Correspondents and Exchanges are requested to direct all mail for the SCIENTIST to 2415 East 13th St, Kansas City, Mo., if they wish prompt answer and proper review.

Editorial.

Prof. F. H. Snow of Lawrence, Kansas, is a man with honor in his own country; his work in the Scientific field has been always inclined to the economical uses of science, and to him we are indebted for the discovery of a means of destroying the chinch bugs. Few persons who have not seen the ravages of this little insect can form any idea of the importance of this discovery.

The following from the Kansas City Journal of October 17, gives an idea of the work being done by Prof. Snow.

LAWRENCE; KAN., Oct. 16– [Special] Chancellor Snow's chinch bug experiments throughout the state are daily proving successes,—he is in daily receipt of letters from farmers telling of remarkable results.

One letter received yesterday from John W. Koonce, Costello, Kas., states that on June 3 he received some infected bugs, which he placed in his fifteen acre wheat field, which was fairly alive with active chinch bugs and threatened to destroy the crop.

In three days time these bugs were all dead and lay thick on the ground, covered with a white fungus growth. Another farmer near by, heard of the success and sent for some infected bugs to place in his cornfield into which the chinch bugs had gone from his wheat field after the wheat had been cut.

The bugs were so thick that the stalks of corn were fairly black with them, but in a few days after the diseased bugs had been distributed in the field, the bugs were lying dead all over the ground, and so great in numbers that they created a stench by their presence.

The Late William Ferrel.

By the death of Prof. William Ferrel, the Kansas City Academy of Science loses its most valued patron and honorary member, and the scientific world one of its most worthy creators. This last epithet may be probably bestowed on one who by his life work developed a science from isolated, and apparently, unrelated facts. This is what Professor Ferrel was largely instrumental in doing for the science of meteorology. In the days of his youth, the laws of storms, or air currents, the relation of electricity to meteorological phenomena, and kindred subjects were but little understood. In fact, it was considered blasphemous to inquire into them. He who would have explained the phenomenon of wind, for instance, would have been considered a profaner. Correct forecasts of the weather would have been convincing proof of witchcraft or some other supernatural power! How much the world owes to such pioneers and creators, discoverers in the fields of science, and especially of those sciences that afford the key to a higher civilization!

Born in obscurity and poverty, Professor Ferrel, by his own efforts, attained a plane as high as that occupied by any of his fellows. Reared on a farm, he was brought in to direct contact with nature from infancy. He was, at an early age, attracted to the study of astronomy. At seventeen he could solve problems in mathematical astronomy that would have puzzled the philosophers of Greece and the ancient world when at the zenith of their fame for learning.

After a successful career as a teacher, a portion of which, we are glad to say, was near Kansas City, at Liberty, Mo., he was appointed by the general government to the offices of superintendent of the coast survey and superintendent of the Nautical Association.

He is the author of more than thirty volumes on various scientific subjects. He is an accepted authority on the subjects to which he gave his attention.

Professor Ferrel resided in Kansas City since 1877. He was so quiet and unassuming that many of his neighbors did not know until since his death that his fame is world-wide and that the learned of all lands and tongues appreciate the scholarship and truthfulness that characterize his works.

We can not close without a brief notice of some of his most important scientific works. In 1856 he published a work on centrifugal force as applied to atmospheric circulation which gave promise of the great things that followed. These ideas were more fully elaborated in a government publication by him entitled, "Motions of fluids and solids on the earths surface. Then came "The Problem of the Tides," "Influence of Earths Rotation on the Motion of Bodies," "Essay on the Winds and Currents of the Ocean," "Cause of Low Barometer in the Polar Regions and in the central part of cyclones," "Relation between the Barometric Gradient and Velocity of the wind," Meteorological Researches" etc. etc. In all of these and many more, the story of his discoveries and conclusions is well told.

As an obscure youth, he commenced his educational career, in the line of original work, with astronomy, so by his own indefatiguable energy, he rose to the zenith and left gleaming there a star of the first magnitude in the scientific constellation.

Several years ago, he donated to the Kansas City Academy of science his scientific library which includes many books that have had an almost life association with him. Under the circumstances, it is right that the Academy cast in its unit to revere and perpetuate his memory.

But the fame of Professor Ferrel does not depend on the weak efforts of our organization, nor of that of any other particular body. His work stands as a monument, one of the noblest achievements of a high civilization, yet it forcasts a much higher civilization, among the achievements of which, man will avert destructive storms on land and sea, prevent cyclones, produce rain by artificial

means, in short, "control the elements" by turning one force of nature against another. This is no day dream. It is not even prophesy. It is prospective history. The meteorologists have been, are, and will be, the principal factors in attaining these grand results. At the head of all who were enrolled in the class prior to 1891 stands the name of William Ferrel to whom we, in common with intelligent people throughout the world, would pay a grateful tribute.

Book Reviews.

The American Geologist for Sept, 1891, contains some strong articles.

Preliminary notes on the Topography and Geology of Northwestern Mexico and Southwest Texas, and New Mexico are given by Robt. T. Hill. The type of monclinal fold whereby the Sierra Chiguitas were separated from Main Monntain, Mass. Section 20 miles north and south. It shows hard limestone formation of the mountain, and the conglomerate formation of the valley.

It also has another cut illustrating the "Sierra Chiginta. Additional notes on the Devonian Rocks of Buchanan County Iowa, are given by S. Calvin. Warren Upham talks about the Ice Sheets of Greenland. E. W. Claypole tells of an Episode in the Palaezoic history of Pennsylvania. Neolithic Man in Nicaragua is treated by J. Crawford. A reply to a review by Frank L. Mason on The Post Archaem Age of the White Limestones of Sussex Co., N. J. is very complete. F. W. Cragin has an article on the Genus Trinacromerum, and Gilbert D. Harris one on the confounding of Nassa Travittala Sas, and Nassa Peralta,

The Geological Publishing Co., Minneapolis, Minn., $3.50 per year, single numbers 35cts.

In its November number the Cosmopolitan will publish a series of letters written by Gen. W. T. Sherman to one of his young daughters, between the years 1856 and 1865, and covering most of the important events of the war of secession. These letters present graphic pictures of a great soldier, amid some of the stirring scenes in which he was a giant figure, and in them the patriotic spirit of the Federal general is seen to have been most attractively tempered by a strong affection for the Southern people. The fraternal feeling which glows in these letters is in refreshing contrast to the sectional bitterness which characterized the period, and they will constitute an interesting and important contribution to the literature of the war.

The illustration of the Cosmopolitan has always been one of special features but this month it exceeds in this respect all previous numbers.

Amelie Rives' striking story "According to St. John" is brought to a dramatic close in this number.

A new feature of the Cosmopolitan, and one which is original with that magazine, is the publication each month, in the form of foot notes, of a number of little portraits with brief biographies, of the writers of the various articles.

An unusual magizine feature, is an article on "Modern Women of Turkey," of beautiful description of Oriental Life by Osman Bey, a distinguished Turkish gentleman now visiting the United States. The most timely article of the number is a description of the New Desert Lake—the phenomenon of the barren region of the south-west. Besides the story by Amelie Rives, Hjalmar Hjorth Boyesen contributes a short story of Norwegian life, in which a beautiful mare figures as the chief character—a charming story for all lovers of the horse.

The chief feature of the number however, is an article on Cincinnati by the man who is most capable of preparing something interesting on that city—Murat Halstead—illustrated by sketches by Jacassy, who visited Cincinnati for that purpose,

Book Reviews cont-

The Eclectic Magazine of foreign literature, science and art contains a resume of all important articles which appear in the reading magazines of Europe. Subscription $5 per year, single copies 45 cents. E. R. Pelton, publisher, 144 Eighth street, New York.

"Railway Law and Legislation," is the title of Vol., I, No., 1, of a magazine intended to cover a literary field not heretofore dealt with in a separate form; the subjects are conveyed in popular form and will be found interesting to those who are not specially seeking railway and legislative information. Single copies 10 cents; yearly $3. Canady West, Gedney & Roberts, Washington, D. C.

Canvall D. Wright, U. S. commissioner of labor, opens the October Popular Science Monthly with the first of a series of "Lessons from the Census" in which he traces the growth of the system by which the census, are taken and shows that it has come to be a somewhat unwieldy instrument by the present method of procedure. Mr. W. F. Durfee, in the series of American industries, gives the history of manufacture of steel from colonial times to the introduction of the Bessemer process; the article is copiously illustrated. Under the title "Metamorphoses in Education." Prof. A. E. Dolbear traces the necessary connection between the new character which human life has taken on, and the rise of scientific education. Prof. G. T. W. Patrick discusses "rivalry of the higher senses" and shows that man is becoming less "ear minded" and more "eye minded." Dr. Fernand Lagrange describes the proper "Exercise for Elderly People." Other articles are "Life on an Ostrich Farm." illustrated, "Dress Ornaments," by Prof. F. Starr, illustrated, "On Polyandry" by Lieut. Col. A. B. Ellis, "The Dogs of Ancient Egypt," by M. G. Maspero, illustrated, "Astronomical Societies and Amateur Astronomers," by M. L. Niesten "The Spinning Sisterhood," by O. T. Miller, "Hearing of the Lower Animals," by M. H. Bonnier," "Sketch of Prof. John Winthrop, portrait. New York. D. Appleton & Co. Fifty cents per number; $5 per annum.

Palaeolithic Knives.

In what would appear to be flint flakes, produced by the manufacture of implements during the palaeolithic period, would now, on account of the discovery of the many similarities, appear to be knives which were used by the aborigines in the same manner perhaps as the more recent scraper. The following will be found characterssticof all these apparent flakes:

(1.) The axis is parallel with the cutting edge;

(2.) There is a knob or "bulb of percussion" at one end;

(3.) They have at least one cutting edge;

(4.) They show natural cleavage on under side;

(5.) The "bulb of percussion," unless very large, is untouched;

(6.) The "bulb of percussion" is on the cutting end;

(7.) The hand work is on the upper side;

(8.) The cutting end is rounded;

(9.) A ridge parellels the axis on the upper side, and

(10.) The extreme cutting end, at point of percussion, is left blunt—untouched;

F. J. Tidswell.

(11.) I have observed that at least ninety-nine and one-half per cent of the knives are right handed, while not more than seventy or seventy-five per cent of other implements are right handed, and

(12.) That the material, whether chert, obsidian, agate or something else, always shows a conchoidal cleavage.

E. Walters.

THE KANSAS CITY SCIENTIST

ASTRONOMY. GEOLOGY. PHILOSOPHY. MINERALOGY. BOTANY. METEOROLOGY. ARCHÆOLOGY. ZOOLOGY. MECHANICS.

OFFICIAL ORGAN OF THE KANSAS CITY ACADEMY OF SCIENCE.

VOL. V. KANSAS CITY MO., NOVEMBER, 1891. No. 11.

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KANSAS CITY, MO.:
ACADEMY OF SCIENCE PUBLISHING CO.,
PUBLISHERS.

THE KANSAS CITY
SCIENTIST
ASTRONOMY GEOLOGY PHILOSOPHY MINERALOGY BOTANY METEOROLOGY ARCHÆOLOGY ZOOLOGY MECHANICS

OFFICIAL ORGAN OF THE KANSAS CITY ACADEMY OF SCIENCE.

VOL. V. KANSAS CITY, MO., NOVEMBER, 1891. No. 11.

Written for the Scientist.

Distribution of the Trees, Shrubs and Vines of Jackson County, Missouri.

By B. F. Bush, Courtney, Mo.

If we draw an irregular line from about eleven miles north of the southwest corner to a point twenty-three miles north of the southeast corner of Jackson county, we have divided the county into two almost distinct floras, which, as the further we leave this irregular line, the more the aspect of the vegetation differs, until we reach the north and south boundaries.

The principal forest growth of this county are the oaks, and in the species of this genus there is a difference of habit that at once attracts the attention. The white oak (*Quercus alba*) is perhaps the most common species, being very common north of this line, but not so much so south; the scarlet oak (*Q. coccinea*) is common south, but not known north; black oak (*Q. tinctoria*) is common south, but very rare north; burr oak (*Q. macrocarpa*), and yellow oak (*Q. Muhlenbergii*) are common north, but not so south; swamp white oak (*Q. bicolor*), and chestnut oak (*Q. Prinus*) are rare north, and not known south of this line; prairie oak (*Q. prinoides*), and black jack oak (*Q. nigra*) are found only south of the line; shingle oak (*Q. imbricaria*) is common south and rare north; post oak (*Q. stellata*) is also common south, and only occurs on one high wooded knob north.

Between the scarlet oaks and the black oaks there does not appear to be very much difference, except that the leaves of the latter are rather thicker and fulvous beneath and hardly so deeply lobed, and the scales of the cup of the former are considerably squarrose, whilst those of the latter

are not. The yellow oak and the prairie oak seem very distinct here, as the latter seldom attains the height of twenty feet, and the former is usually a large tree with larger acorns. The swamp white oak scarcely differs from the chestnut oak, except that the latter has longer acorns, whilst the peduncles of both are very short, being less than an inch long; perhaps both are but forms of either *Q. bicolor* or *Q. prinus*, but the fruiting peduncles are shorter than the petioles in each. Further study will be necessary to determine the relationship of these two oaks.

In other trees and shrubs the demarcation is not so evident yet, but when the ground has been gone over more carefully and we are better acquainted with the distribution of certain species, then we will find, no doubt, that all are more or less affected as are the oaks.

Of all the willows, only two, the black willow (*Salix nigra, var. Wardi*) and the prairie willow (*S. humilis*) are common south of this line, and do not occur often north; the almond willow (*S. amygdaloides*), the diamond willow (*S. cordata, var. vestila*), the shining willow (*S. lucida*) and the long-leaved willow are abundant north, but do not occur to any extent south; the buckthorn (*Rhamnus lanceolatus*), and the fragrant sumach (*Rhus aromatica*) are common south, but not so north; the copal sumach (*R. copallina*) is common in the south part and rare in the north, while the poison oak (*R. toxicodendron*) is just the contrary.

The only shrub so far that is common to both divisions of our county is the common sumach (*R. glabra*), as is also the hazel (*Corylus Americana*); specimens were collected south which apparently were the beaked hazel (*C. rostrata*) but later researches have failed to show that we have more than one species of hazel.

Fraxinus pubescens and *F. viridis*, the red and green ash are common north, but not known south; the white ash (*F. Americana*) is common north and occasionally south; *Celtis Mississippiensis*, the yellow hackberry, is not known south, but is very common north; the common hackberry (*C. occidentalis*) is common north, but more rare south; the pawpaw (*Asimina triloba*), mulberry (*Morus rubra*) and persimmon (*Diospyros Virginiana*) are very common north, but rather uncommon south.

Of the grapes, three species, the river grape (*Vitis riparia*), the ashy-leaved grape (*V. cinerea*) and the false grape (*V. indivisa*) are common north, but are very rare in the south, while the other two species, the summer grape (*V. aestivalis*), and the winter grape (*V. cordifolia*) are occasionally found south, and commonly north.

There are only four hickories in the county, and one, the big shell-bark (*Carya sulcata*), does not occur south of the line; two others, the

shellbark (*C. alba*) and the bitternut (*C. amara*) are common north, but not south; the rough shellbark (*C. tomentosa*) is common south of the line, but not north.

Of those that are common north of the line and not so south are the following species:

Red elm (*Ulmus fulva*).
White elm (*U. Americana*).
Buttonwood (*Platanus occidentalis*).
Box-elder (*Negundo aceroides*).
Rough-leaved dogwood (*Cornus asperifolia*).
Prickly ash (*Xanthoxylum Americana*).
Linden (*Tilia Americana*).
Walnut (*Juglans nigra*).
Black cherry (*Prunus serotina*).
Climbing bittersweet (*Celastrus scandens*).
Red haw (*Crataegus subvillosa*).
Burning bush (*Enonymus atropurpureus*).
Virginian creeper (*Ampelopsis quinquefolia*).
Buckeye (*Aesculus glabra*).
Bladdernut tree (*Staphylea trifolia*).
Black sugar maple (*Acer saccharinum var. nigrum*).
Silver maple (*A. dasycarpum*).
Redbud (*Cercis Canadensis*).
Coffee tree (*Gymnoeladus Canadensis*).
Honey locust (*Gleditschia triacanthos*).
Elder (*Sambucus Canadensis*).
Hop tree (*Ostrya Virginica*).
Cottonwood (*Populus monilifera*).

The species that are common south and uncommon north are the following:

Wild plum (*Prunus Americana*).
Cockspur thorn (*Crataegus Crus-galli*).
False indigo (*Amorpha fruticosa*).
Crab apple (*Pyrus coronaria*).
Sheepberry (*Viburnum Lentago*).
Kinnikinick (*Cornus sericea*).

The following are common south and very rare north of the line:

Red cedar (*Juniperus Virginiana*).
Panicled dogwood (*Cornus paniculata*).
New Jersey tea (*Ceanothus Americanus*).
Red root (*Ceanothus ovalis*).
Lead plant (*Amorpha canescens*).
Red haw (*Crataegus tomentosa*).

The following species are common north, and are rare, or do not occur at all south:

Rock elm (*Ulmus racemosa*).
Ninebark (*Physocarpus opulifolius*).
Serviceberry (*Amelanchier Canadensis*).
Honeysuckle (*Lonicera parviflora*).
Buttonbush (*Cephalanthus occidentalis*).

That herbaceous species are more or less restricted by this difference of forest growth there is no doubt, as there is a distinct prairie flora that comes well up to the line, and in a few cases overlapping the river flora, and a river flora which extends from the Missouri south to the line, and beyond it along the valleys of the two Blues. But with the exception of the plants which follow the valleys of Little and Big Blue, there may be said to be two clearly defined areas of plant life in Jackson county, one of which is influenced more or less by the humidity of the adjacent river, and therefore is heavily wooded and includes all those plants which inhabit rich woods and low sandy bottoms; the other is affected by the dry winds from off the prairies to the south and southwest and consists of oak mottes, barrens and strips of prairies and inhabited mostly by prairie plants.

Written for the Scientist.

Investigation of a Mound Near Jefferson City, Mo.

By A. S. Logan.

Recently, a party consisting of engineers and employes of the Missouri River Improvement Commission began an exploration of one of the mounds, a work of a prehistoric race, situated on the bluff which overlooks the Missouri River

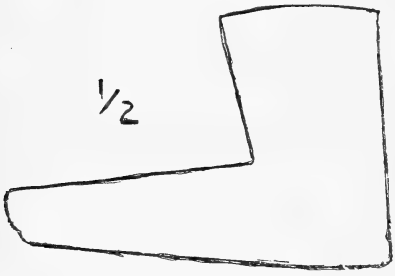


FIG. 1

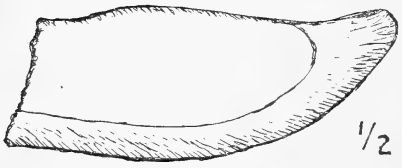


FIG. 2

from an elevation of one hundred and fifty feet; located about six miles below Jefferson City.

This mound is one of about twenty embraced in a circle, one quarter of a mile in diameter.

The above party selected the mound in question apparently at haphazard; all the mounds presenting nearly a uniform outline, differing only in size and mostly circular in form, and from twenty to twenty-four feet at the base, rising to a height of eight feet and under. A trench was cut on a level with the natural soil, penetrating the mound about eight feet. A stone wall was encountered which was built very substantially, making access in that direction difficult, in consequence of which the earth was removed from the top for the purpose of entering from that direction. The earth was removed for a depth of four feet when the top of the wall was exposed. Further excavation brought to light human bones, some of them fairly well preserved, especially the bones of the legs. On the removal of these and a layer of clay, another layer of bones was exposed, but presenting a different appearance than the first, having evidently been burnt or charred, a considerable quantity of charcoal being mixed with the bones. In this tier were found portions of several skulls, lying close together, as if they had been interred without regard to order. They were, in all probability, detached from the body when buried.

The portions of the skulls found were those of the back of the head, no frontal bones being discovered. Some jaw bones with the teeth attached were among the remains, but only that portion of the jaw containing the molar teeth.

A few pieces of flint weapons were found in the upper layers, and nothing else of any significance.

At this juncture the diggers abandoned the search, and some days later the writer, desirous of seeing all that was to be seen, resumed the work and removed the earth and remains until the bottom of the vault was reached; several layers being thus removed. All of these had evidently been burnt, as charcoal and ashes were mixed with the bones of each succeeding layer. The layers were about an inch in thickness with from two to four inches of earth between, and small, flat stones, about the size of a man's hand, spread on each different layer as if to mark its division from the next above.

Between the bottom layers, mixed with charcoal, ashes and small portions of burnt bones were found, what gives value to the search, numbering about fifty tools and a smoking pipe.

The material of the tools is the same as the rock forming the vault, locally known as "cotton rock." I would consider it a species of sandstone.

Overlying the ledge of "cotton rock" in the bluff is flint in great quantities, and in every conceivable shape, that these people could have resorted to had they been so disposed, and why they used the softer material I will leave to some archæologist to determine. The tools, themselves are made after no pattern, but selected for their cutting qualities, as they all have a more or less keen edge which could be used for cutting purposes, and were no doubt highly prized, as they were found all in a pile in one corner of the vault and on top of which was found a stone pipe. The pipe is made, bowl and stem together, and it is curious that people of such crude ideas of tools and weapons should manufacture such a perfect specimen of a pipe. It is composed of a very heavy stone, the nature of which would be difficult to determine as it is considerably burned.

A description of the vault will be found interesting to many; the wall of the vault rests upon the natural surface of the ground about three feet high and eight and a half feet square, the inside corners being slightly rounded; it is built in layers about four inches in thickness and varying in length upwards to three feet, neither cement nor mortar being used in the joints; the corners formed a sort of recess as they were drawn inward to the top in which many of the stones were found. The stone for constructing the vault was brought from a distance of about a quarter of a mile as there is none in sight nearer.

I assume from all these circumstances that these people lived in this neighborhood anterior to the age of flint tools, as the more recent interments indicate that they were then entering upon the flint industry, and it may be that the "cotton rock" had become obsolete.

These people buried their dead on the highest ground, covering and protecting them with these great

mounds, when it would seem much easier to bury as at the present day; but instead, they, with great labor, carried the rock from a great distance, and it is reasonable to suppose, also, that the earth was brought from a distance with which they are surrounded and piled high above as there is no trace of an immediate or local excavation.

In my view from the mounds and their surroundings I would unhesitatingly say the water, the foothills of the glacier and the swamps left in its wake were but a short distance to the north of them, and during the summer months the melting ice would send a volume of water down this valley that the Missouri River of to-day is but a miniature of, and therefore the highest hills were the only land that could be used by that ancient race.

In this connection I would make the following suggestions that may lead to more important disclosures: My object is the hopes of a more thorough investigation at some future time. Nearer to the top of the mound was found, certainly, the remains of a people of more recent date than those found in the vault, as their bones were larger, which would indicate a more stalwart tribe, and also their mode of burial was different, as there was no indication of fire being used as was the case with the lower burials. I would pronounce the upper interments those of Indians of the present day; the tools found with these were weapons of the chase. On the other hand those found in the vault were of a peaceful character, and their surroundings would readily comport, in my opinion, to the glacial period. The entire absence of flint in the bottom of the mound would show one of two things, either they were unacquainted with the use of flint or at that time there was no flint to be had—it is there now in great abundance in such forms for cutting purposes that would render the "cotton rock" almost useless. The flint is found in a hill close to the river bank about half a mile from the mound, and the upper portion of the ledge has the appearance, to me, of glacial action and probably forms a moraine, as it has, evidently, been pushed over the underlying ledge, and been ground and splintered in a manner that could not have been without great crushing force. It would be reasonable enough to suppose that the action of the river may have uncovered this flint by washing away the softer material since the occupation of the older race.

In relation to the Indian interment in the examined mound, I could not say distinctly whether the Indian burials had been such as to make them aware of former burials or not, but I think from the thickness of the clay between the two that they were ignorant of former burials. The mounds of the modern Indian, so far as my investigations are concerned, would indicate a more rudely formed structure which would

appear to be an imitation of the older mounds, as they are not finished with like care nor have they the interior structures.

The pipe which is shown in figure 1, also the tools of which figure 2 will give a fair impression, are deposited in the collection of Mr. E. Butts of Kansas City.

Written for the Scientist.

The Joplin, Missouri, Mining District.

By G. C. Stealey.

The production of zinc and lead in Missouri has increased so much of late years that it now forms a very important part of the industrial wealth of the state, and a very large percentage of the zinc output of the world.

So far as development shows, the so called Zinc Belt extends along the southern side of the Ozark mountains from Madison county on the east to the southwest corner of the state and on into the Indian Territory and Arkansas. The district with which the writer is familiar has the towns of Joplin and Webb City as its center, and is honey-combed with shafts, both old and new, for a distance of about ten miles in all directions. A great many of these shafts were made in the early days of the district in searching for lead, and after the lead was worked out, or not finding any, or being driven out by water, were abandoned. At that time, fifteen or twenty years ago, zinc ore, strange to relate, was not recognized by the miners of the district, and shafts were often abandoned when it was found in large quantities as they said it "drove out" the lead. When mined at all it was thrown out on the dumps as being valueless and a nuisance generally. It received the name of black jack, the origin of which name is shrouded in mystery.

In the Joplin district, galena or lead ore (sulphuret of lead) was the first sought, the miners as stated being unfamiliar with the value of the jack. Galena is found there, as a rule, nearer the surface than jack, although there are many exceptions, but it is also found as deep as the mines of the district have been explored. In this galena there is nothing else of value in the arts in sufficient quantity to justify its being saved, it being about 90 per cent. lead. A great deal of the lead ore is smelted into pigs at Joplin. The ore is also shipped in bulk as it comes from the mine.

Galena occurs in cubical crystals, in some instances alone, in others accompanied with crystals of calcite. The contrast of the dark, metallic blue of the galena cubes with the milky semi-transparent crystals of the calcite making specimens of great beauty.

The town of Galena, Kansas, eight miles west from Joplin, is a very important lead mining center.

The zinc ores of the Joplin district are generally composed of sul-

phuret of zinc or *blende* and *calamine*, oxide of zinc and carbonic acid.

Blende occurs in its pure state, the crystals of which are rhombic octahedrons, dodecahedrons, or intermediate and imperfect forms, forming solid masses. It occurs alone, with clay or combined with calcite. Some of the crystals are very fine, having a beautiful amber or resinous color, clear as gems. The colors range from amber to jet black.

Calamine has a vitreous and resinous color. It is more in demand than any other on account of the facility with which brasses may be manufactured from it. The above ores and others resembling them are called by the general name of jack.

There are other ores in the district, one kind called clay bone or carbonate that is said to carry about twelve dollars per ton of zinc. It is widely distributed but so far there has been very little done with it. It is found in Lawrence county.

The characterization of the counties of Jasper, Newton, McDonald, Barry and Lawrence, usually called southwest Missouri, is that they are covered with the ever present chert, an impure kind of flint. This rock generally comes to the surface, or is only covered with a few feet of soil. Where exposed to the weather it occurs in small, irregular fragments from one to six inches across with very sharp edges and corners. At greater depths it is in larger fragments. Very great irregularity marks the disposition of this chert with the regular limestone of the district, as the flint sometimes underlies the limestone, the limestone itself occurring in masses with no regularity of strata. The whole formation seems more like a deposit of drift than anything else.

The limestone bears but little, if any mineral, but the calcite, which is a later formation, is intermingled with the lead and zinc. The mineral occurs in large or small masses, called "pockets" or distributed more or less thickly through the gangue, or earth, flint or gravel that forms the surrounding ground, the adjacent crevices of the rock being frequently filled with asphalt or bitumen of the consistency of wax.

The surface indications seem to have little to do with the position of deposits of lead and zinc, as it is found in ravines and on the prairie.

Limestone ledges are usually avoided, shafts being as a rule abandoned unless knowledge of the locality leads miners to believe that they are near the edge of the "bar" as it is called, when they attempt to reach it by drifting. It is at the edge of limestone bars that the mineral is frequently found. The limestone is probably the secondary rock, as fossils of the ammonite forms are sometimes found.

It is a fine sight, though somewhat startling experience, to be let down in a bucket into one of the well developed mines. The cham-

bers are sometimes stoped out to a height of one hundred feet, with pillars of the mineral bearing material of immense proportions left to support the roof. Winding passages and dark and gloomy abandoned drifts, in many cases caved in, or if in clay, swelled until almost closed; the throbbing of the pumps, the stunning shock of the blasting and ubiquitous and chilling waters from all sides make up a scene to impress one with the beauties of nature on the surface above and the possibilities of the hereafter below.

There seems to be no definite theory of the cause of the formation of lead and zinc in the zinc belt rather than anywhere else, nor as to how it was formed. Appearances seem to bear out the theory that it is forming still, as tools have been found in some of the old abandoned mines of 20 years ago that have been reopened incrusted with zinc crystals. The writer has found in an excavation on an old road crystals of lead of a delicate shape, showing that they formed in the mud from material dropped from the ore wagons.

Dilute sulphuric acid dissolves zinc, forming sulphate of zinc; this solution flowing down or up as the case may have been, would deposit its excess in all openings met with in its progress, along with carbonate of lime (calcite), forming the crystals as now found. There is no lack of sulphur, that we can readily understand, but where the waters found the zinc originally is a question none can answer. Even if this theory is correct, it only accounts for the present form of the mineral. The mystery of its origin is as unfathomable as ever, unless it came from the store houses of old earth far below and the mineral belt is but a system of fissures forming a channel of escape for the mineral bearing waters.

But surmise will never advance us much in our knowledge of this district; it will take years of toil and immense expenditure of capital. In Belgium the zinc mines have been sunk to a depth of 2,000 feet. In the Joplin district 200 feet is about the deepest attained, yet it is said one of the mines at Blendeville, Jasper county, is the richest zinc mine in the world. There is everything to encourage the belief that greater depths will reveal richer deposits of mineral.

The present money value of the output from the district is about $100,000 per week. Lead is worth about $25 per 1,000 pounds and zinc about $23 per ton.

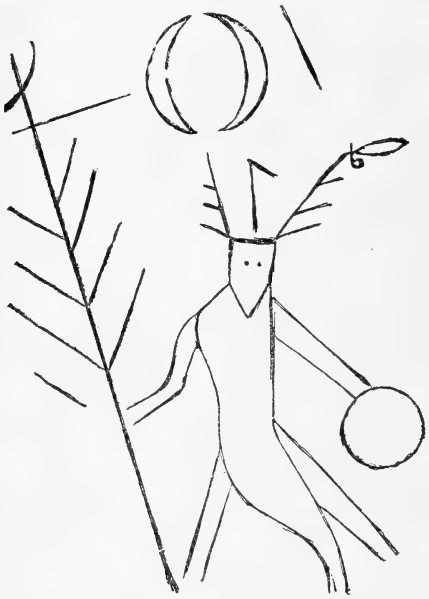
MR. EDISON has recently presented to the public his philosophical views of animation or energy, which is substantially that every existing atom contains its ratio of vitality. This is commented on in the usual way by eminent scientists, but, in the usual way, the results are just as indefinite as the conclusions of the philosophers of ancient Greece.

Written for the Scientist.

Engravings on the Rocks of Natural Fort, Colo.

By E. Butts.

The cut below represents one-sixth the natural size of an inscription copied from the rocks of "Natural Fort," in Larimer county, Colo., in the spring of 1882.



Natural Fort is located on Lone Tree Creek near the line between Colorado and Wyoming about one mile and a half east of the Colorado Central railroad; it is a sandstone formation full of crevices and ledges, covering about one acre of ground and has an elevation of about twenty-five feet above the general elevation of the surrounding country. Seen from half a mile distant it very much resembles the ruins of an ancient castle standing alone on the prairie. Other engravings were on the rocks, but they were eroded to such an extent as to make their outlines uncertain.

The Fort — so-called — evidently has been used as a receptacle for the dead by the Indians, as quite a quantity of white and blue beads were found associated with human teeth. However, the burials must have been made years ago as there were no other traces left of human existence excepting the carvings, teeth and beads to be found.

Written for the Scientist.

Mexican Pottery.

By S. J. Hare.

One of the first arts attained by man was the manufacture of pottery. The remains of his earthenware vessels are scattered over the entire world, wherever he has lived. This pottery varies in composition, color, ornamentation and shape. From a study of the types from the various countries we readily see the degree of civilization reached by those early inhabitants, for art is the index to civilization and the early man could only display his art in the embellishment of his utensils.

From a study of the North American pottery we at once conclude that the early inhabitants of Mexico had gained the highest rank of civilization, for their pottery is far superior in design and ornamentation.

The accompanying illustration shows some handsome specimens of Mexican pottery owned by Mr. W. A. Brigham of this city. Some of these specimens were found by Mr. Brigham, others he secured from personal friends, residents of Mexico.

The first figure on the left is a stone image, representing a female figure. It is beyond doubt a rare specimen and the most valuable in the collection. It was found at the time the excavation was being made for the foundation of the present cathedral in the City of Mexico. Many of the Aztec relics in the Mexican National Museum were found in this excavation, and it is supposed that the spot now occupied by this magnificent cathedral is the same once covered by the Aztec temple, dedicated to the worship of the sun. The renowned "calendar stone" came from this excavation and is now in the museum there. This image is composed of a manufactured stone. Age and disintegration have dimmed the characters that adorned the entire surface, yet the outline of the peculiar markings can be traced. The illustration does not show these markings, but gives a general outline of the image.

The W. A. Brigham Collection of Mexican Pottery.

The tall, square vase to the right of the image and the headless image in the center of the group were found about one hundred miles east of the City of Mexico and just north of the line of the Mexican railroad. The vase is black and resembles most of the Mexican pottery. The surface is glazed, the markings on it

as well as those on the image, are the characteristic markings of the Toltec pottery. The image is lighter in color, being of a dark brick red. It has been badly broken; all the pieces except the head were found and glued together.

The round covered vase in the right of the group was found twenty-five miles east of the City of Mexico. There are three rows of faces around the vase and one row around the cover. These faces are good types of those usually found illustrated in works on Mexican antiquities.

To the right of the foot of the headless image, is the head of a turtle (probably). This Mr. Brigham found at the base of the great pyramid at Cholula. He says that the ground around this pyramid is covered with fragments of pottery and broken images. This pyramid was, no doubt, once a place of worship.

The other specimens were secured from friends in Mexico; the locations are not yet known.

Many imitations of Mexican pottery are being made and sold to tourists; this, however, does not warrant any one to make the statement that there are only a few pieces of genuine Mexican pottery in existence. Any one who has spent much time in Mexico knows that there is an abundance of genuine pottery to be had, and one can tell the genuine from the imitation after examining a few specimens, although there are a few imitations that are hard to tell from the genuine.

A German firm at Zarcetacas make a business of manufacturing imitations of Mexican pottery, and they have the business well learned, for their work is sold for fancy prices and the country is flooded with their imitations.

Persons traveling in Mexico and wishing to secure genuine Aztec pottery, can do so by securing the advice of some responsible person before making a purchase. Prof. Josi. J. Garcia at the Hotel Grand, Zarcetacas, Mexico, one of the professors in the college there, is a good judge of the genuine article; the professor of the National School of Agriculture in the City of Mexico, and the curator of the Mexican National Museum, are also experts.

Prof. Edwin Walters has visited the noted pottery field of Guadlajara (pronounced wawd-ly-hairy) and has seen the genuine pottery exhumed. From Prof. Garcia at Zarcetacas and from his own personal observations, he has secured the following facts that will aid one in selecting the genuine Aztec pottery:

All the pre-historic pottery was burned by applying heat to the inner walls when it was possible to do so.

It was probably burned by placing each separate piece in the ground and then building a fire within it.

It is never homogeneous in consistency.

It is often made of two or more layers of different clays.

The outer wall is always more porous than the inner.

When coloring matter was used for ornamentation, it nearly always consisted of an ochreous clay or a different clay of some kind.

The clay so used for ornamentation was inlaid on the outer wall of the piece while both were in a plastic state.

The Mound Builders.

In Mr. Logan's description of a recently excavated mound, contained in this number of the SCIENTIST, there was found undoubted intrusion burials. This method of burial, which was extensively adopted by the American Indian, as shown by many of the explored mounds of the Mississippi Valley, has been the means of causing more confusion in regard to a definite conclusion as to the distinction of the mound building race, than any other recorded item.

These remains of the mound builders are regarded as the most ancient human structural work on the American continent and it is with the greatest difficulty that any bones from the older burials are preserved as they are in such a state of decomposition that they crumble with the slightest movement, still it is claimed that many skulls of undoubted original mound builders have been preserved by authors of wide repute, always presenting some plausible act of nature as to how they were preserved during the ages of their interment, when as a matter of fact they are simply presenting the skull of a modern Indian, but upon this basis the opinion is formed in regard to the origin of the mound builders which is quoted one to another until it is finally accepted by the majority, that these ancient people were really Indians, such as Americans of to-day. This is further substantiated, it is to be regretted, by the publication of such biased articles as that of H. W. Henshaw in the second annual report of the bureau of ethnology.

Gold at Kansas City.

Gold has been discovered at Kansas City, Mo., in the general geological strata of the state No. 64. The location of this discovery, however, is on the north side of the river, opposite the city, at a depth of one hundred and twenty feet below the bed of the Missouri river. From a small quantity of sand ground up by the drill, several nuggets about the size of small shot were taken. As to its being in quantities sufficient to pay for working has not yet been determined.

WE notice, according to Worcester, it makes no difference whether the insects of the genus bumbus is called bumble bee or humble bee; however, we prefer to call it bumble bee, because there are times when it cannot be humble, judging from our own experience.

SOAPSTONE or steatite is now made into stoves, sinks, paint, etc.

The Scientist.

FORMERLY THE NATURALIST.

Entered at Kansas City, Mo., for transmission through the mails at second-class rates.

KANSAS CITY, NOVEMBER, 1891.

A Monthly Journal Devoted to all Branches of SCIENCE.

THE ACADEMY OF SCIENCE PUBLISHING CO.,

Publishers and Proprietors,

KANSAS CITY, MISSOURI.

EDITORS:

R. B. TROUSLOT, JOSEPH SHARP, M. D., E. BUTTS, DAVID H TODD, SID. J. HARE.

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SID. J. HARE, Secretary,
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THE delay in issuing the SCIENTIST has been a great inconvenience to us, but we hope with a new printer we will make up the lost time as well as put out a better appearing job of press work.

THE *Texas Siftings* is the author of the following:

EDISON, THE PROMISER.

"Edison promises immediate electric motors for street railways. It is a pity that he did not invent his motor before our streets were torn up for the cable roads. But has he really invented it, or is he only thinking about it? Edison would be a much greater man if he talked less to the reporters. He is always confiding to them some tremendous invention which exists only in his mind. During recent years he has invented nothing but toys, like the phonograph, of no practical utility. He is very rich, and wealth seems to have made him lazy. Next to Barnum, he is the shrewdest advertiser that ever lived, and he can get more free notices on a less capital of fact than even George Francis Train. If he does not wish his electric motor to be ranked with the Keeley motor let him invite railroad men to his factory and show them his model in actual operation."

We must say in behalf of Mr. Edison that a man who has made so many remunerative inventions need not rush one of imperfection upon the market at this time. We believe, however, that delay with Mr. Edison, only means that the motor will be more perfect when it appears.

Missouri River Improvement.

The Commercial Club of Kansas City have appointed a committee, consisting of the president of the

club and twelve members, to be known as the Missouri River Improvement Committee. The purpose of this committee is to devise and encourage an extensive improvement of the Missouri River, especially between Kansas City and St. Louis. They have already issued circulars containing relative freight rates where navigation is a competitive and otherwise, also, accompanying, an address of Mr. S. H. Yonge, division engineer in charge of the Missouri River's improvements which are now in progress.

There can be no doubt as to the advisability of improving this great, almost natural, steamboat means of communication between distant points, as every merchant or individual who ships goods and pays a freightage will testify, and it must not be assumed that benefits stop here as all in both near and distant points would feel more or less the advantages of the result of the final completion of this great enterprise.

The Missouri River is one of the great rivers of the United States; its fertile valley has made it unexcelled in a commercial way and it is a deplorable condition in which the millions who are interested are placed to have so near a natural water course capable of the best navigable facilities and still be so inadequately provided for, so far as economical transportation is concerned.

It is to be hoped that The Commercial Club will be aided by all in this movement and finally succeed in its effort to provide this needed improvement.

The amount estimated for doing the work is twenty million dollars, or fifty-two thousand dollars per mile, which is recommended in appropriations of not less than two million dollars annually; this should probably be made not less than four million dollars annually, as it would then, at the minimum rate, require five years to finish the work.

Book Reviews.

The Chautauquan for December has several illustrated articles and the portraits of a number of prominent men and women. The following is the table of contents: The Battles of Princeton and Trenton, by John Clark Ridpath; Domestic and Social Life of the Colonists, III., by Edward Everett Hale; States made from Colonies, by Dr. James Albert Woodburn; The Colonial Shire, by Albert Bushnell Hart, Ph. D.; The History of Political Parties in America, III., by F. W. Hewes; Sunday Readings, Selected by Bishop Vincent; Physical Life, III., by Milton J. Greenman, Ph B.; National Agencies for Scientific Research (The Weather Bureau), by Major J. W. Powell, Ph.D., LL.D.; The Parasitic Enemies of Cultivated Plants, by B. T. Galloway; The Scottish Language, by Rev. Wm. Wye Smith; Good Manners for Young People, by Theodore Temple; Modern Treatment for Insanity, by C. R. Hammerton; Moral and Social Reforms in Congress, by George Harold Walker; Fur-Seal and the Seal Islands, by Sheldon Jackson, D.D.; Charles Stewart Parnell, by Ralph D. St. John: A Trip up the Nile, by Armand de Potter; Lelia Robinson Sawtelle, by Mary A. Greene, LL B.; The Homes of Poverty, by Emily Huntington Miller; Prepared

Food on a Scientific Plan, by Helen M. Ellis; Women in Astronomy, by Esther Singleton; Qualifications Requisite for the Trained Nurse, by Lisbeth D. Price; The Art of Visiting, by Kate Gannet Wells; Women in the Land Office, by Ella Loraine Dorsey; The German Girl of the Middle Ages. The editorials treat of Christmastide, Foreign Visitors to the Columbian Exposition, The Methodist Ecumenical Council in Washington, and Literature as a Profession. There are the usual departments devoted to the Chautauqua Literary and Scientific Circle.

The Popular Scientific Monthly, for December, 1891, contains: The Rise of the Pottery Industry, by Edwin Atlee Barber; The Development of American Industries Since Columbus, X. (illustrated); Progress and Perfectibility in the Lower Animals, by Prof. E. P. Evans; Type-Casting Machines, by P. D. Ross, (illustrated); Breathe Pure Air, by the Rev. J. W. Quinby; Dress and Adornment, IV., Religious Dress, by Prof. Frederick Starr, (illustrated); Some of the Possibilities of Economic Botany, (Concluded) by Prof. George Lincoln Goodale; The Lost Volcanoes of Connecticut, by Prof. Wm. Morris Davis, (illustrated); The Training of Dogs, by Wesley Mills, M.D., (illustrated); Silk Dresses and Eight Hours' Work, by J. B. Mann; Dust, by J. G. McPherson; Sketch of Dimitri Ivanovicii Mendeleef, (with Portrait). Correspondence—Righting the Bicycle; The Kelley's Island Groove. Editor's Table—The Strong Man; Political Justice; Tramp Colonies. Literary Notices; Popular Miscellany; Notes.

The Eclectic Magazine of Foreign Literature for November contains the following articles: The New Emperor and His New Chancellor; The Great Work; The Antipodeans; Herrick Ibsen; Advertising in China; The Story of a Violin; The Spanish Story of the Armada; Russia Under Alexander III.; Accidental Conversation; Science and Society in the Fifties; The Blind Summit; Secret Societies in China; Marlowe; The Wild Woman as Social Insurgents; The Abbe's Repentance; Impressions of England; The Ballad of the Hulk; Ernest Renan; On the Ancient Belief in a Future State.

The Literary Light contents: Origin of Life—A Criticism of Mr. Geo. Davis' Theory, by Leroy Berrier; Wanted—A Novelist for Woman, Jane Mead Welch; From a Book Label, Poem; Art of Book Selling; Topical Scrap Books and How to Fill Them. The last article will be found of interest to many. We have found the envelopes themselves to form a convenient scrap book, each article to be numbered and indexed on back of envelope.

Plain Talk for November: A Night of Peril; Games and Pastimes; Ladies department has many things new; Numismatics; Philately, Under Natural History; The Greatest of Volcanoes; Do Pearls Get Ill? Deep-Sea Sponges; Bumble Bees and Red Clover; All About Bananas; Archæology is represented by an article on Indian relics in Montgomery county, N. Y. An Ohio Earthquake.

The Mineralogists Monthly for November has a very interesting account of the Mammoth Cave of Indiana; Uranium in the Black Hills; Gold Mining in Pennsylvania; Pre-historic Monsters; Traveling Mountain and other notes of interest.

Aluminum Age for November contains notes on Alumina and Aluminum; New Way of Making Steel Castings; About Pyritic Ores, an Economic Process of Smelting.

Journal and Proceedings of the Hamilton, (Canada) Association for Session 1890–91.

Contents:— Officers, 1890–91; Officers since 1857; Abstract of Minutes; Early History of Hamilton; Surface Geology of the County of Lincoln and Neighboring Counties; Egypt, with some Account of the Book of the Dead; Connecting Links; Flutes of the Time of Moses; Botanical Jottings; Reports of Philological Section; Anglicism in Lower Canadian French; Report of Bilological Section; Notes on Domestic Animals; Report of Geological Section; Stromatoporidæ; Notes on Burlington Heights; Notes on the Asteroids, etc.; Indian Ossuary of Burlington Beach; Notes on Cœlentarata; Notes on Marine Animals; Irish Celts and their Relics; Reports of Officers. Five full page plates.

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OFFICIAL ORGAN OF THE KANSAS CITY ACADEMY OF SCIENCE.

VOL. V. KANSAS CITY MO., DECEMBER, 1891. No. 12.

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KANSAS CITY, MO.:
ACADEMY OF SCIENCE PUBLISHING CO.,
PUBLISHERS.

THE EXETER VASE

THE KANSAS CITY
SCIENTIST
ASTRONOMY GEOLOGY PHILOSOPHY MINERALOGY BOTANY METEOROLOGY ARCHÆOLOGY ZOOLOGY MECHANICS

OFFICIAL ORGAN OF THE KANSAS CITY ACADEMY OF SCIENCE.

VOL. V. KANSAS CITY, MO., DECEMBER, 1891. No. 12.

Description of the Exeter Vase.

[Proceedings of the Academy of Science.]

By E. Butts.

The frontispiece of this issue of the Scientist represents one of the most remarkable finds in the way of ancient art and stone carving that has hitherto been discovered in the prolific archæological producing State of Missouri, and in fact it is a question whether the territory might not be extended to embrace the United States.

The alluded to carving is a vase composed of sandstone covering a superficial area of about thirty-six square inches and standing about four inches in height; on each of the four corners is carved a head, one of which represents that of a human being and the others respectively that of a puma, a wild cat and a bear; the carvings of the animal heads are made with such accuracy that there can be no mistake as to their identity, and would be a credit to a modern work of art of like character.

The human head is, no doubt, a correct likeness of the people who were associated with the artist and is regarded as the most correct representation, now extant, of an ancient indigenous tribe of America; the hair is arranged in a manner indicative of a vast amount of taste as it flows in graceful curls over the back and shoulders, giving the whole an airy aspect most difficult to attain in works of art; the forehead and countenance generally are full of expressive intellect, although the nose is nearly worn off, and the mouth formed with lips in relief, similar to mound and toltes or Aztec carvings; however, there is not, as is the case with most of the ancient American works, a lack of finish or distorted, caricatured features, but

an apparent endeavor to produce a natural likeness, which evidently the animal carvings will bear out.

In the carvings representing the animals, the wild cat and especially the puma, holds its tongue in a position which is characteristic of the ancient works, both in stone and clay of Central America and Mexico.

The exterior of the vase is of rectangular form and the interior is circular, being scooped out to a capacity of about half a pint; the creases and irregular parts still retain a crust-like formation, composed mostly of alkali, which formed during its exposure to the soil in which it was buried.

The vase was excavated near Exeter, Barry County, Missouri, in the construction of the Exeter division of the St. Louis and San Francisco Railway in 1880, and was presented to the writer by Mr. J. L. Stubblefield, C.E.

It is to be regretted that the depth beneath the surface from which it was taken, also the exact nature of the soil can not be given, as the laborers brought it in after their day's work simply for a curiosity of an ordinary character, and it is not known to have formed a part of any financial transaction.

Exeter is situated on an extensive plateau or table land of the Ozark mountains, about two thousand feet above sea level; this table land slopes in a southerly direction, broken, prairie like, with ravines and hills of small magnitude which are covered with a dark soil, susceptible of growing the finest farm products.

Arrow heads, lances, scrapers and other relics of the stone age are so frequently unearthed as to warrant a conclusion that at some remote time this locality was extensively populated.

Written for the Scientist.

Mathematics.

By John Maloney.

It is not my intention to enter into a lengthy discussion of the practical utility of the mathematics, nor is it my purpose to point out the relative merits of their various branches, but I shall at once strive, with as much brevity and as little dryness as possible, to make a plea for their cultivation, that is to show that an assiduous application to their study is most highly conducive to the development of the individual mind, the extension of the realm of science and the progressive expansion of the laws of thought.

Of all the mental faculties, reason undoubtedly holds the highest and most important place. It is the calm, invisible and unbiassed preceptor that teaches us to distinguish between the just and the unjust, the right and the wrong, and that points out with unerring correctness what is good, beautiful and true. Whether we sit by the peasant's humble hearth or enter the councils of the nation, ever is it pre-eminent, ever all-ruling.

It is reason alone that enables us to appreciate duly the eloquence of a Lacordaire, the deep philosophy of a Lamarck or the tangled subtleties of a Stuart Mill.

Reason is the ever burning lamp within that guides us through the mazes of conflicting theory; it is the touchstone of all knowledge; the sole and final arbiter between truth and error. Reason is the compass by which the mental bark of each must be steered, if it would escape being buffetted helplessly this way and that way by the waves of controversy and opposite opinion, to be finally shattered on the breakers of despairing doubt, and would reach the peaceful harbor of certainty and knowledge.

Depreciate pure science as you may, it is impossible to deny the power of geometry to educate the reason. Here we can leap to no false conclusions, but must proceed step by step in the path of our argument, a flaw in which at once becomes patent and hinders our arrival at an absurd conclusion. It is as true of geometry as of every other branch of science, that there is no royal road to learning, but however for a while obscure may be our progress, there are no will-o'the-wisps in the shape of false theories to lead us into swamps of error from which there can be no escape.

Where, indeed, can we find a sounder chapter of logic than in a proposition of Euclid of logic leading from the simplest of axioms by a series of beautiful synthetic processes to the soundest of practical conclusions. The chain of reason has to be carefully unfolded link by link. Nothing can be omitted, nothing may be skipped over. Omit one of the preceding propositions and the *Pons asinorum* becomes impossible.

There is nothing in the evolution of knowledge that can in any wise compare with the development of the mathematics from the times of Descartes to the present, and the end is not yet. When the minds of Leibniz and Newton almost simultaneously brought forth the calculus that has wrought such wonders in the analytics of mathematics, even their great geniuses could never have foreseen the more magnificent and later conceptions of Hamilton and Grassman, the applications of which in our own day bid fair to revolutionize the workings of our science while leaving its principles intact. The more rigorous our reasoning the more subtle the methods of our analysis, the more simple and therefore the more intrinsically beautiful our conclusions. The singularly elegant Infinitesimal Calculus bids fair to be entirely supplanted, except as a matter of historical mathematical development, by the even more singularly elegant Calculus of Quaternions, which offers us a more powerful weapon of reasoning, of equal accuracy and more general conclusiveness. The memory is no longer taxed with formulæ—

pure reason is all we need. And who can say what may be the outgrowth of a closer application of the methods of the *Ausdenungslehre* or Extension-Calculus of Grassman? The discovery of Sylvester's Theorem including the particular case of Newton's rule, and of Fourier's Theorem, including that of Descartes' rule, both of the utmost importance in the Theory of Equations, are additional examples of the acquisitions to the realm of science made in modern times by the labors of mathematicians.

The influence of mathematical methods on the laws of thought themselves is, too, overwhelming. It is only because of their strict conformity with the processes of mathematical reasoning that the laws enunciated by the theory of evolution have met with such general acceptance. The studies of that eminent Irish mathematician, the late Doctor Boole, in logic, the science of thought itself, resulting in the application of strictly mathematical rules to the statement of the abstract truths of that science, founded upon what is known as the qualification of the predicate, may ultimately work a change in the very forms of exact thinking.

No less than reason, do the mathematics cultivate the imagination. It has been said with truth that he who, of all antiquity, deserves to be ranked next to Homer for strength of imagination, is Archimedes, the mathematician of Syracuse. And who that has ever read a section of the Principia or studied a chapter in astronomy, will deny that Newton, that giant intellect of modern times, was a man of the most powerful imagination? The works of Argand, Servois, Francais, Gergonne and other mathematicians too numerous to mention, teem with evidences of the imaginative powers of the geniuses whose labors they represent. The discovery of the law of gravitation by Newton, the inspiration of Hamilton that gave us the system of quaternions, the founding of the modern geometry by the immortal Poncelet, show more evidence of brilliant imagination than do any poems, with scarcely an exception, that have been in recent times produced.

In the department of transcendental geometry and the domain of dimensional space, there are great opportunities for the imaginations of future thinkers. The number of geometrical prime-forms is only limited, maybe, by the horizon of our intellectual vision. The processes which enable us to apply accurate reasoning concerning the workings of forces at infinite distances to produce finite effects are still in the embryonic stage of development, and the very nature of the most mysterious and subtle of Nature's agencies—electricity—will, if ever discovered, be probably disclosed to us by the imaginative thought of some one or other eminent mathematician. The existence of the luminiferous

ether, the theory of vortex rings and a hundred other matters of profound mathematical moment, are yet within the field of legitimate speculation. The discovery of the planet Neptune at the point of the French mathematician's pen to be afterwards verified by actual observation, is but one example among many of great encouragement to work in speculative mathematics.

In a great degree, also, is memory an essential to, and therefore its development assisted by, the study of mathematics. The example of Euler, the blind mathematician who, by the aid of memory alone, was able to solve mentally problems of great length and intricacy, speaks in this connection eloquently for itself. While the higher branches of the sciences appeal, as I have said, less and less to memory and more to the pure reason, we cannot grasp the rigor of their methods without beginning at the beginning of our science. And in the early stages of a mathematical training, the memory is constantly appealed to and its cultivation becomes absolutely indispensable. Rules must be learned, formulæ committed to memory or we can never become adepts in practical mathematics. And all this must be done too, while the mind is young and fresh and the memory yet plastic. You may as easily teach an old man how to fiddle as to give any one whose mathematical education has not begun in early youth, command over geometrical artifices or dexterity in mathematical manipulation.

Here then, I rest my plea. The critical acumen, the avidity to know the *raison d'etre* of everything, the insisting on technical accuracy that are engendered, with a myriad other qualities of great advantage to their possessor in the votaries of this science, I will not dwell upon. Enough has been said to show that learning and education can rest on no sounder or more worthy basis than this.

I would not, however, detract from the practical value of the study of the natural sciences or the humanizing effects of the classics, while insisting on a mathematical foundation for all true learning. Let us rather, while demanding the introduction of the study of the mathematics at the earliest possible age into every academical curriculum, endeavor, by a happy combination of the *dulce* and the *utile*, to fulfill the true aim of every educational system, the complete evolution of the mental faculties, the harmonious development of the whole mind.

According to the statistics of the Woman's Christian Temperance Union of the State of New York, the young women and children of New York City spend annually, for chewing gum, six million dollars; if this estimate is correct, by comparison, what an enormous amount must be spent annually on the much more filthy practice of chewing tobacco.

Franklin.

By D. M. Todd.

The life of Benjamin Franklin is one of marked peculiarities and great varieties. One very striking feature of his biography, and perhaps the most striking, is the many different channels of usefulness and genius which he has followed up with such remarkable success in each channel. His life is treated in many different ways, by many different authors, from many different standpoints, so that we can barely glance at his vast achievements.

We see a great statesman in Daniel Webster, a great philanthropist in David Livingstone, a great electrician in Edison, and a great philosopher in Socrates; but in Franklin we have all these attributes equally distinguished in one man.

He is well formed in stature and compact, with a cheerful and benign countenance, a man temperate in all things, one not addicted to any vicious habits, simple and sincere in his language, a great reader, orderly, patriotic and religious. He is very industrious and enterprising, and one of his mottoes is, "Spend no time in idleness; make every moment useful."

His public life embraces five distinct, important and remarkable themes, all of which are uniquely characterized and forcibly demonstrated. He is the electrician, the moralist, the philanthropist, the philosopher and the politician.

As an electrician he ranks as one of the foremost in advancing the elementary ideas and principles of that great science which now governs the motive and heat power of many of our time and money saving inventions. He was the man who conceived the idea that lightning was electricity, and discovered the difference between positive and negative electricity, and was the inventor of the lightning rod, a very useful instrument to modern civilization.

As a moralist he not only leaves his moral and proverbial sayings, but leaves us a wholesome example for imitation and emulation, and his teachings will live and grow in the hearts and minds of the American people. While young he conceived the idea of reaching moral perfection and conscientiously labored to that end—a very high and beautiful standard for one so young to cherish. In this respect he becomes a second Tupper, leading the human race step by step to a higher level and directing their minds to the "One Model Figure" of perfect humanity.

As a philosopher he has outclassed all other attainments by his incomparable success in this particular.

We all not only respect wisdom, but admire it, and who is there that will not say Franklin was a model man in this respect.

In *Poor Richard's Almanac* his pithy remarks, proverbial and philosophical sayings, are morally, socially and intellectually elevating and especially adapted to a practical busi-

ness life and to that class of people who are obliged to work for a living. Such is his fame in this respect that his maxims are known by nearly every child, and practiced by nearly every enterprising adult.

Being skilled in the art of printing, he established a newspaper in Boston, and the first magazine of the country. The daily newspaper is perhaps the most influential agency now in existence in forming public sentiment. Mr. Franklin's library in Philadelphia is known as the "Mother Library of North America" and the original library of Philadelphia.

Mr. Franklin may be called a philanthropist. He is quoted as saying that he believed the greatest service rendered to God was the service rendered to man. In every question of public or private interest he is always found on the side of humanity. He has rightly been called the "working man's friend." He certainly knew how to sympathize with the mechanic and the laborer, and never rose so high in literary or scientific life that he forgot the days spent in hard toil and servitude. Yes, even more, I fancy those men who were working so diligently in shops and stores felt an inspiration as they looked on the benignant countenance of Franklin, so void of conceit, so full of sympathy—of whom even the wise sought counsel—to know that he had risen from the ranks where they now stood.

Whoever dishonors America's farmers or mechanics, dishonors the greatest men America has ever had.

As a politician he was one of the shining lights of his time. The favorite counselor of most of grave difficulties of that period of American history.

It is said that Washington and Franklin were two great instruments of the revolution. Washington by destroying enemies, Franklin by making friends.

Mr. Franklin acted an important part in four very important political events. He was the principal man in having the stamp act repealed; was embassador to France and made negotiations with that country to aid America in the revolution; took part in signing the Declaration of Independence and helped frame the American Constitution.

In fact this political life was crowned and crowded with good deeds, noble impulses and effective resolutions, and he was a great factor in America's early life and helped to train the young tree which is now the pride of nations.

If we appreciate our freedom as American citizens, if we glory in our union, if we honor the stars and stripes, if we love our country, if we can say with the poet—

> "My native country thee,
> Land of the noble free,
> Thy name I love.
> I love thy rocks and rills,
> Thy woods and templed hills,
> My heart with rapture thrills,
> Like that above,"

then we must not forget that we owe a large share of our national

progress and prosperity, as well as our national inheritance and personal freedom, to Benjamin Franklin.

Do we not sometimes in the midst of pleasant environments—of blue skies free from tyranny—where a "man is a man for a' that," where the sun shines on free homes and prosperous people, forget the days of oppression and tyranny, the graves of martyrs and patriots, and the bowed and perplexed form of the American philosopher as he sits buried in thought and trying to untangle the problems of American oppression, trying to save the people from despotism and tyranny to give them a title deed of Liberty. Do we not sometimes forget the trouble, toil, sorrow and subjection it cost the form of Benjamin Franklin. Hasten the day when every true American citizen will feel grateful to God for a Benjamin Franklin.

When we view these combined elements so rich and so rare, when we see how they were all modestly, frankly and tenaciously devoted and dedicated to the interest of God, America and humanity, how it ought to incite our love and gratitude to the man who possessed and utilized them.

Among America's honored dead none save Washington and Lincoln will command that respect, adoration and love like the name of Benjamin Franklin.

For his fidelity we honor him, for his wisdom we respect him, for his lofty character we admire him and for his brotherly kindness we love him.

The New Geology.

Mr. W. J. McGee has, of late, been industriously working to revive some enthusiasm in the distinction or classification of geologic eras. The method alluded to has been, to some extent, presented by some of the most eminent geologists of Europe and America, and by way of some recent discoveries it is now presented by Mr. McGee with corresponding additional force and a general appellation of "The New Geology."

It is not probable, however, that the old method of distinguishing geological eras will, in the near future, be disregarded and a new method, generally, take its place, however meritorious the new method may be, as the literature of the former would hold its claim for generations to come.

The new proposed method of geological record is, for the most part, based upon Physical Geography and accordingly the different eras, periods, etc., are recognized in conformity with the process of formation; whether or not this method should be adopted in whole or in part it will be found interesting to even the amateur in this branch of science.

The whole field of geology is briefly covered by categories as follows: Principal category and subordinate categories. The principal category contains two sub-categories, deformation and gradation, both of which are again divided by

two sub-categories, deformation, including elevation and depression, and gradation, including deposition and degradation.

The subordinate category contains five sub-categories as follows: extravasation, alteration, glaciation, eolation and vital action.

Extravasation contains two sub-categories, efflux and collapse; alteration contains two sub-categories, lithification and delithification; also glaciation contains two sub-categories, glacial construction and glacial destruction; and also eolation contains two sub-categories, eolic construction and eolic destruction, and vital action contains various constructive and destructive processes.

The development of mountains and continents would be in, according to the above classification, the principal category, first sub-category deformation, second sub-category elevation or depression.

The changes in the terrestrial surface caused by aqueous erosion would be in the principal category, first sub-category gradation, second sub-category degradation or deposition.

The changes in the terrestrial surface caused by volcanic action would be in the subordinate category, first sub-category extravasation, second sub-category efflux or collapse.

The changes in the earth arising from percolating water, air or other gases would be in the subordinate category, first sub-category, alteration, second sub-category lithification and delithification.

The changes in the earth's surface caused by glacial action would be in the subordinate category, first sub-category glaciation, second sub-category, glacial construction or glacial destruction.

The changes in the earth's surface made by currents or wave action would be in the subordinate category, first sub-category eolation, second sub-category eolic construction or eolic destruction.

The changes in the earth produced by organic life would be in the subordinate category, first sub-category vital action, second sub-category various constructive or destructive processes.

Salton Sea.

The "Salton Sea," according to Dr. P. G. Cotter, of Yuma, is a permanent inland lake and will eventually attain an area of nearly one thousand square miles with a depth of about three hundred feet.

Engineers have examined the break through which the river is flowing into the basin, where the lake is forming and have found that the channel is cut away about six feet deep at present but is continually increasing by erosion; the river inlet is elevated one hundred and forty-three feet above the sea level, and the lake inlet is one hundred and thirty-seven feet above sea level, and the elevation of the basin is two hundred and sixty-three feet below the sea level; these facts are the evidence on which Dr. Cotter bases his opinion and is sufficient to warrant his conclusions.

The Development of the Column.

[Proceedings of the Kansas City Academy of Science.]

By Chas. W. Dawson.

I promised you a paper upon primitive and early architecture.

Perhaps one of the most useful and ornamental features of architectural design is the column, and I hope I may interest you to some extent in its early history.

Probably the first habitations worth mentioning that were built by mankind, were constructed of young trees, their butts thrust into the ground around a circle, with the tops drawn in and bound together. The spaces between the ribs thus formed were interlaced with boughs, rushes, or some suitable material; these again being daubed with mud. As soon as primitive man had fashioned instruments with which he was able to hack down larger trees and to roughly dress them, he began building houses of rectangular form, with thatched roofs. As his ideas and ability increased he enlarged upon this scheme, projecting his roof in front of his house to form a covered space, and within his house widened the distance from wall to wall. In either case the roof needed some extra supports, and these he made by placing a forked tree beneath the log used for a rafter. The next advance was a rough decoration of this column made by hewing the shaft and the forking branches into a more definite form, with possibly some rude carving upon the lower side of the forks.

We have taken as an hypothesis that our primitive man was a dweller among forests; but what did he do where he had no trees, or, as was the case with the Egyptians, very few? Having marked out the plan of his house, the Egyptian bound together bundles of reeds or lotus with bands of byblus. Placing a large bundle at each external angle of the house, a smaller one was placed at each internal angle. These were held in a vertical position by stays, and fastened together with ties of byblus. At short intervals still smaller bundles were placed opposite each other along the inside and outside lines of the future wall. Across the tops of those smaller columns on the outside line of the wall, other bundles were laid horizontally butting against and bound to the top of the main columns at the corners. The walls were now filled in with sunburned brick and tempered clay. It is probable that at some time the Egyptians, as well as other early peoples, built columns of small stones and of bricks. In either case the column would need some sort of flat plate placed upon the top of it to distribute the superimposed load through all parts of its upper surface.

These are the three most important primitive forms, and in each of these three we can watch a gradual development into a distinctive style.

In the Yezidee houses of the present day we see the old forked column of primitive man with but few improvements. Finding that the columns needed something to rest upon which was broad enough to prevent them from crushing into the earth and from being undermined by the wearing away of the dirt around their bases through the constant passing to and fro within the house, or that combined with rain, in the case of those outside, they placed underneath them a rude base and plinth block. As the roofs grew larger and weightier it took the combined strength of several rafters over each line of columns to support it. To uphold these rafters they cut off the two forks at the same height and placed upon the tops of them a short piece of timber, hewn off smooth on its upper surface.

From this rude forked column were developed the two distinctive styles of Assyrian and Persian capitals. The most peculiar is that which is called the double bull capital. In the great hall of Xerxes, in Persepolis, the best examples have been found. They are 67 feet 4 inches in height from the floor to the top of the bulls' heads, or 64 feet to the under side of the beam that lay between the bulls.

The other order has rather an Ionic style of volutes and is nearly identical with the former except in the height of the shaft. The capital, however, is very different, being 16 feet 6 inches in height, making the whole order 57 feet 9 inches. This latter order when used internally was surmounted with brackets of wood which supported the roof. It is probable that they were used externally, and the bull capital was placed above them. The shafts had upwards of fifty flutes and the bases were moulded and ornamented in a very rich manner.

The earliest example of a stone copy of the Egyptian bundles of reeds, we find at the tombs at Beni Hassan in Middle Egypt. These chambers are cut into the rock and many of them are so cheerful and well lighted as to make one doubt whether they were originally intended for tombs or for dwellings. In one of these tombs we find a stone column, which is plainly a copy of the old reed construction. A flat plate has been added at the top and bottom, but here we have bonds of byblus around the neck of the column and above them a swelling out of the reeds to form a capital. This became the favorite form of capital among the Egyptian architects.

In another of these tombs we find a reed column with a lotus flower for a capital. These tombs belong to the 12th Dynasty which commenced 2528 B. C.

In the Rhamession built by the great Rhamses of the 15th century B. C., we find good examples of the later types. Here the shafts have become perfectly round, but the general form of the columns shows plainly their derivation.

There is still another Egyptian type, and this suggests the Assyrian style, having heads of Isis for its capital.

At Beni Hassan we also find the prototype of the Doric order in the stone copies of brick columns which have a square abacus above a round shaft. Beside this early example we have twenty-seven other proto-Doric columns to turn to if we wish to prove that the Greeks borrowed their Doric order from the Egyptians. They are in eight different buildings between the cataracts and Lower Egypt, and are enumerated by Mr. E. Falkener in his Memoir, Vol. I, Museum of Classical Antiquities. The most striking instance of resemblance to the Greek order is found in a capital from the South Temple at Karnac. Here is the abacus separated from the shaft, a strong capital Echinus, a beaded necking, and a fluted shaft, all that the Doric order has, except its elegance of treatment.

The most beautiful of the Doric temples, the queen of all architectural achievements, the most exquisite of all the buildings in the world, and justly the most celebrated, is the Parthenon. You have seen casts from its various parts hanging in the rooms of the Kansas City Art Association, and even from these fragments may judge of its great beauty.

Science perfects genius.—*Dryden.*

William Ferrell.

Do you know that one very important fact has been omitted in notice of Wm. Ferrell—your account of him was good.

"FERRELL'S LAW.

"Whatever be the latitude, a person traveling with the wind either from north or south, would be gradually turning towards his right in the Northern, and towards his left in the Southern Hemisphere." This is the case whatever be the latitude.

More fully: "In whatever direction a body moves on the surface of the Earth, there is a force arising from the Earth's rotation which deflects it to the right in the Northern Hemisphere, but to the left in the Southern." The law was applied to the atmosphere by Prof. Wm. Ferrell, and published by him in June, 1859, and applies to all bodies, whether solid or liquid, and to the air. It governs tornadoes and all storms. (See Appleton's Physical Geography.) G. C. Broadhead.

Mr. H. F. Petric, in recently excavating the pyramid of Medum, the tomb of the third Egyptian dynasty, which is said to be the oldest structure in the world, dating back about 4000 B. C., found what he concludes to be the result of a religious difference in the modes of burial of the people at that period, one class making full length interments, and another interring with the knees drawn up to the breast.

The Scientist.

FORMERLY THE NATURALIST.

Entered at Kansas City, Mo., for transmission through the mails at second-class rates.

KANSAS CITY, DECEMBER, 1891.

A Monthly Journal Devoted to all Branches of SCIENCE.

THE ACADEMY OF SCIENCE PUBLISHING CO.,
Publishers and Proprietors,
KANSAS CITY, MISSOURI.

EDITORS:

R. B. Trouslot, Joseph Sharp, M. D., E. Butts, David H. Todd, Sid. J. Hare.

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The Recent Earthquake in Japan.

This is without doubt the most destructive earthquake in the history of mankind; the earth seemed to open and close as if the surface was only a thin scum on a turbulent sea, as one of the papers has put it, "the surface was shaken like a carpet, was ripped, torn, bounced up and down, and twisted in every direction."

Sand, salt water and mud were forced up through the great crevices where the earth had split open, and as the earth settled back many were the victims that were enclosed in its horrible gaping jaws.

Hundreds and hundreds of square miles suffered from its terrible effects, and it is estimated that it will take six or eight months to repair the damage done to the railroads alone. A village of eighty-nine houses near Gifu sank two hundred feet below the surface. The north side of the sacred mountain Fujeyama, some 1,200 feet in width, has subsided to a depth of about six hundred feet. One of the cracks in the earth was six hundred feet deep and eighty miles long. In the three cities, Gifu, Nagoja and Ogaki, about 12,000 persons were killed.

The board of regents of Ann Arbor have purchased the geological collection of Dr. Rominger, which consists of about six thousand specimens from the Mesozoic of Central Europe.

Literary Notes.

The Popular Science Monthly is rapidly coming to the front as an illustrated magazine. Until recently it published only a few simple drawings, where they were specially needed to supplement the text, but the January number is to have no less than sixty illustrations. Those in the article on American Pottery are especially noteworthy, and the other illustrated articles are Remarkable Bowlders, Tail-like Formations in Men, The Aviator Flying Machine, and The Musk Ox. The frontispiece is a portrait of Prof. Elias Loomis.

The kinship which Darwinism recognizes between man and the brutes is strongly confirmed by the facts in an article on Tail-like Formations in Men, to appear in the January *Popular Science Monthly*. The researches of several German physiologists are here presented, and pictures of a number of these strange formations are given.

Theology and Political Economy is the subject of Dr. Andrew D. White's next chapter in his Warfare of Science series in *The Popular Science Monthly*. Paying for the use of money is the matter in which the church has most seriously obstructed commerce, and a full history of the conflict over interest is given in this article. It will be published in the *Monthly* for January.

An illustrated sketch of certain Remarkable Bowlders, by Mr. David A. Wells, is to appear in *The Popular Science Monthly* for January. These immense stones, weighing thousands of tons and found hundreds of miles from their places of origin, give striking testimony to the mighty power of glacial action.

Mr. Carroll D. Wright will have an interesting study of Our Population and its Distribution in the January *Popular Science Monthly*, showing the movement of the center of population westward, and how the people are distributed with respect to topographical features of the country, rainfall, humidity, etc.

All interested in the teaching of young children will be glad to read Mrs. Mary Alling Aber's account of An Experiment in Education, in the forthcoming January *Popular Science Monthly*. It is a sample of the sporadic efforts to introduce little children to real knowledge, which promise valuable results in the near future.

The Chautauquan for January presents the following attractive table of contents: The Battles of Saratoga, by John G. Nicolay; Domestic and Social Life of the Colonists, IV., by Edward Everett Hale; Trading Companies, by John H. Finley; The History of Political Parties in America, IV., by F. W. Hewes; States Made From Territories, I., by Dr. James Albert Woodburn; Sunday Readings, Selected by Bishop Vincent; Physical Life, IV., by Milton J. Greenman, Ph.B.; National Agencies for Scientific Research, IV., by Major J. W. Powell, Ph.D., LL.D.; Science and the Feeding of Animals, by V. Hallenbeck, A. M.; The Cruise of the "Quaker City," by Mary Mason Fairbanks; Progress in the Nineteenth Century, by Edward A. Freeman; Some Propositions of Nationalism, by Edward Arden; Niagara the Motor for the World's Fair, by Prof. John Trowbridge; Is Oratory a Lost Art? by E. Jay Edwards; Practical Questions in the Italian Government, by Vilfredo Pareto; Richter, a Painter of Picturesque Portraits, by Maurice Thompson; The Legal Relation of Parent and Child, by Mary A. Greene, LL.B.; The Kindergarten Movement in Chicago, by Antoinette Van Hoosen Wakeman; How Women Figure in the Eleventh Census, by Margaret N. Wishard; The Temperance Tidal Wave in Boston, by Mary A. Latbury; Women's Robes in the Orient, by Countess Annie de Montaigu;

The London Woman's Outdoor Life, by Elizabeth Roberts; Women in the Pension Office, Second Paper, by Ella Loraine Dorsey. The editorials treat of A New Occupation for Old People, The Daughters of the American Revolution, and Russia and the Jews. There are the usual departments devoted to the Chautauqua Literary and Scientific Circle.

The Eclectic Magazine of Foreign Literature for December, 1891, contains the following: The Demoralization of Russia; The Antipodeans: The Reflex Effect of Asiatic Ideas; The Emancipation of Women; Two Brothers and Their Friends; The Grindstone Theory of the Milky Way; His Private Honor; In a Dim Light; Austria: Its Society, Politics and Religion; French and English; The Chinese Atrocities; Is Man the Only Reasoner? Charles Stewart Parnell; The "Interviewer" Abroad; Political Pamphlets by Men of Genius; Darwinism in the Nursery; A Cannibal Plant.

The Taxidermist—a monthly, published at Akron, Ohio; E. W. Martin, editor; 50c per year.

The Mineralogists Monthly, published at Jersey City, N. J., Arthur Chamberlin, editor; 50c per year.

The Eclectic Magazine of Foreign Literature—a monthly, E. R. Pelton publisher, 144 Eighth st., New York; $5.00 per year.

The Phonogram—a monthly; V. H. McRae, manager, Pulitzer Building, Room 87, New York.

Our Dumb Animals—a monthly; Geo. T. Angell, President Boston Humane Society.

The Elisha Mitchell Scientific Society—semi-annual, Chapel Hill, N. C.; Geo. F. Atkins, President, Auburn, Ala.

The Eleventh Census—An address by Hon. Robert P. Porter before the American Statistical Association, Boston, October 15, 1891.

The Iowa Mutual Improvement Journal—monthly—S. B. Thomas, editor, Dubuque, Ia.

The Young Men of the World—monthly—Thos. Chamberlin, Jersey City, N. J.; 25c per year.

The Home Queen—monthly—Wm. Butt, editor, Philadelphia Pa.; 50c per year.

The Ottawa Campus—monthly—Ottawa, Kas., published by the Ottawa University Oratorical Association; 75c per year.

The Nautilus—a monthly—H. A. Pilsby, editor, Philadelphia, Pa.; $1.00 per year.

Hall's Journal of Health—monthly—340 W. Ninth st., New York city; $1.00 per year.

Aluminum Age—monthly—Newport, Ky.; 50c per year.

Literary Light—monthly—Minneapolis, Minn., Chas. D. Raymer, editor; $1.00 per year.

The Open Court—weekly—Chicago, Ill.; $2.00 per year.

Lanphear's K. C. Medical Index—Emory Lanphear, M. A., M. D., editor; $2.00 per year.

Plain Talk—a monthly—No. 5 Beekman st., N. Y., 50c per annum.

The Ornithologist and Botanist—a monthly—Willard N. Clute, editor, Joseph E. Blain, publisher; 35c per year.

Printers' Ink—weekly—Geo. P. Rowell & Co., publishers, No. 10 Spruce st., New York.

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TIERNAN-HAVENS PRINTING CO., KANSAS CITY.